EXHIBIT A

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ENTROPIC COMMUNICATIONS, LLC,

Plaintiff

v.

CHARTER COMMUNICATIONS, INC.,

Defendant.

Civil Action No. 2:22-cv-00125-JRG

OPENING EXPERT REPORT OF STEVEN H. GOLDBERG REGARDING INVALIDITY OF U.S. PATENT NOS. 8,223,775; 8,284,690; 8,792,008; 9,210,362; 9,825,826; AND 10,135,682

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6	Charter's June 13, 2023, *Markman* Presentation
7	Expert Report of Sylvia D. Hall-Ellis, Ph.D. and attachments and exhibits thereto

I. INTRODUCTION

1. I submit the following expert report, pursuant to Fed. R. Civ. P. 26(a)(2)(B), setting forth the opinions I have formed and may offer at trial of this action regarding the invalidity of the asserted claims of U.S. Patent Nos. 8,223,775 (the "'775 Patent"), 8,284,690 (the "'690 Patent"), 9,825,826 (the "'826 Patent"), 8,792,008 (the "'008 Patent"), 9,210,362 (the "'362 Patent") and 10,135,682 (the "'682 Patent").

2. It is my opinion that claims 18 and 19 of the '775 Patent, claims 1, 7, 8, 9, 11, 15, and 16 of the '690 Patent, claims 1-4 and 6-9 of the '826 Patent, claims 1 and 2 of the '008 Patent,[1] claims 11 and 12 of the '362 Patent, and claims 1-3 of the '682 Patent are invalid for the reasons discussed below.

II. BACKGROUND AND QUALIFICATIONS

3. A copy of my *curriculum vitae* is attached hereto as Exhibit 1.

4. I hold M.S.E.E. and B.S.E.E. degrees from Washington University in St. Louis, MO, and a Ph.D.E.E. from the Department of Electrical and Computer Engineering at the University of California at Santa Barbara. The subject of my dissertation was signal processing for broadband communications.

5. Since November 2021, I have been a Managing Partner at Finistere Ventures, an early stage venture capital firm headquartered in Palo Alto, CA, which focuses on technology-based companies in and around the food and agriculture ecosystem, including the related areas of transportation, supply chain, finance, security, ML/AI, and robotics.

[1] It is my understanding that Entropic asserted claims 3-6 on June 23, 2023, and that I will supplement my expert report to address these claims at a later date yet to be determined.

6. During the period 2009-20, I was an Operating Partner at Venrock, a leading global venture capital firm located in Palo Alto, CA. I managed a technology portfolio and identified attractive new business opportunities in sectors that included wireless, security, location services, robotics and satellite technology. While at Venrock, I was a frequent public speaker and panelist on a variety of management and technology topics. I provided Venrock with business and technical diligence support on a wide array of technologies, including wireless, telematics, automotive, machine learning, robotics and IoT. I reviewed/diligenced over 5000 technology companies for Venrock.

7. From August 2007 to November 2008, I was President and CEO of Datarunway, Inc., an early-stage high-technology company located in Cupertino, CA, that worked on providing broadband Internet and telephone service to commercial aircraft and private planes in flight. The company's intellectual property ultimately was used to support broadband services for the cruise ship industry.

8. From January 2007 to July 2007, I was President and CEO of Vidient Systems, Inc., in Santa Clara, CA. I had overall responsibility for a 3-year old venture-backed start-up/turn around in the video surveillance market. Vidient's products included the SmartCatch family of software analytics and hardware processing platforms.

9. For a year, April 2005-April 2006, Venrock Associates engaged me as a full time contractor, to assist in identifying new business opportunities in the wireless, security, networking, and/or location markets.

10. During the period October 2000 to February 2005, I was President and CEO of Arcwave, Inc. in Campbell, CA. I was the first employee of a VC-funded startup company supplying wireless broadband access products to the global cable industry. I assembled an

executive team and led the key technology developments as well as the marketing and sales strategy and corporate fundraising. My work at Arcwave included overseeing the development of a last-mile wireless cable extension product for Enterprise broadband voice/data service offering from the cable industry. Arcwave's customers included Comcast, Time Warner, Adelphia, Charter, Mediacomm, and Cable One.

11. From August 1999 to October 2020, I was Vice President, Research & Development at Nokia Corp. in Mountain View, CA. I assisted with the integration of the then recently acquired Ipsilon Networks. I was responsible for a $70 million R&D budget and 275 engineers worldwide. The core products were tied to networking and internet application appliances with strong ties to next generation packet-based cellular systems.

12. I served as President and CEO of Verticom, Inc., in Santa Rose, CA, from December 1997 to August 1998. I was responsible for a VC-funded wireless restart that was involved in radio subsystems for satellite and terrestrial wireless infrastructures.

13. Before that, from March 1995 to December 1997, I was Vice President, General Manager, of the Wireless Communications Division at Cylink Corporation in Sunnyvale, CA.. I reported directly to the CEO and created the wireless business unit. Cylink's products included spread spectrum radio-modems, with worldwide distribution in over 90 countries with 6 international sales offices.

14. Earlier, I worked at Trimble Navigation Ltd., in Sunnyvale CA. First, as a Senior Engineer in the Survey Division (1991-93), then as Manager in the Communications Systems Group in the Vehicle Tracking Division (1993-95), and later as Program Manager in the Military Division (November 2008-September 2009).

15. Before joining Trimble, I worked as a Program Manager in the Wireless Communication Division of Applied Signal Technology, in Sunnyvale, CA (1988-91), as an instructor and product engineer at Hewlett-Packard Co. (1979-88), as a Radar Engineer at Emerson Electric Co. and as an RF and Microwave Engineer at California Microwave, Inc. (1976-78).

16. I have been a member of the boards of directors of: Solid Power, Inc., a developer of next generation all solid-state batteries for electric vehicle and mobility applications; Future Dial, a mobile device processing robotics and automation software company; Savari, an automotive technology company; Lucid Motors, an electric vehicle company; and Red Seal, a cybersecurity software company. I also served on the board of directors of Silicon Valley Forum, a non-profit organization focused on fostering innovation and entrepreneurship in Silicon Valley. I have also acted as an advisor to several additional companies. In addition, I am an inventor of U.S. Pat. No. 5,742,509 (Personal Tracking System Integrated with Base Station) and 4,410,949 (Controller for Fuel Dispenser). I have also authored a number of publications and taught as a visiting/adjunct college professor.

III. MATERIALS CONSIDERED

17. In forming my opinions and preparing this report, I have reviewed the materials listed in Exhibit 2 hereto.

IV. COMPENSATION

18. I am being paid my usual consulting rate of $400 per hour for my work on this case. My compensation is not based upon the outcome of this case or the nature of my opinions.

V. PRIOR TESTIMONY

19. During the last four years I have testified as an expert witness at trial or deposition in the following cases:

Broadcom v. Toyota, Case No. 337-TA-1119 International Trade Commission

u-blox AG, Japan Radio Co., Ltd., Petitioners v. Broadcom Corp., Patent Owner, IPR2019-00737, IPR2019-00816, Patent Trial and Appeal Board

NextStep, Inc. v. Comcast Communications, 19-1031-RGA-SRF U.S. District Court, District of Delaware

Smartsky v. Gogo, C.A. No. 22-266-V AC-MPT, U.S. District Court, District of Delaware

Omnitracs v Platform Science, CASE NO. 3:20-cv-0958-CAB-MDD, U.S. District Court, District of Southern California

Unified Patents v.. IV, IPR2022-0709, Patent Trial and Appeal Board

Cellwitch v. Tile, Case No. 4:19-CV-01315-JSW, U.S. District Court, Northern District of California , Oakland Division

VI. LEVEL OF ORDINARY SKILL IN THE ART

20. I understand that during the claim construction phase of this litigation, Defendant Charter Communications, Inc. ("Charter") took the position that in the context of the patents-in-suit, a person of ordinary skill in the art ("POSITA") would be "a person having at least: a bachelor-level degree in electrical engineering or a related subject and three or more years of experience working in the field of cable television signal processing and communication systems; a master's-level degree in electrical engineering or a related subject and one or more years of experience working in the field of cable television signal processing and communication systems; or a Ph.D.-level degree in electrical engineering or a related subject and at least some experience working in the field of cable television signal processing and/or communication systems. Additional education may substitute for professional experience, and significant work experience may substitute for formal education." Declaration of Dr. Kevin Almeroth Regarding Claim Construction, ¶ 27 (attached hereto as Exhibit 3). I consider this definition to be reasonable in the context of the patents-in-suit.

21. I also understand that Plaintiff Entropic Communications, LLC ("Entropic") takes the position that a POSITA would have been "an Engineer with at least a Bachelor's Degree in Electrical Engineering (or equivalent), with at least two years of experience developing broadband/cable TV/satellite communication systems and solutions." Plaintiff's Opening Claim Construction Brief, Dkt. 97 at 6 (May 9, 2023).

22. My opinions are the same regardless under both of these definitions.

VII. APPLICABLE LEGAL PRINCIPLES

a. Patent Validity Generally

23. I understand that a patent is presumed valid; that patent invalidity must be proven by clear and convincing evidence; and that the burden of proving invalidity is on the party asserting it, here, defendant Charter Communications, Inc. I further understand that clear and convincing evidence is that which produces in the mind of the decision-maker an abiding conviction that the truth of the factual contentions is highly probable. In forming my opinions, I have used this standard.

b. Claim of Priority

24. I have been informed that in order to be entitled to the benefit of the filing date of an earlier-filed application (including a provisional application), a later-filed application must be an application for a patent for an invention which is also disclosed in the prior application, i.e., the parent or earlier-filed nonprovisional application or provisional application for which benefit is claimed. That is, the disclosure of the prior-filed application must provide adequate support and enablement for the claimed subject matter of the later-filed application. I have been informed that this requires that the specification of the provisional application must contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise,

and exact terms, to enable an ordinarily skilled artisan to practice the invention claimed in the nonprovisional application.

c. Anticipation

25. I have been informed that an invention must be new to be entitled to patent protection. A patent claim is invalid as having been ***anticipated*** by the prior art if every one of the elements of the claimed invention is disclosed expressly or inherently, in a single prior art reference or a single prior invention, arranged or combined in the same way as recited in the claim. I understand that to establish inherency the missing descriptive matter must necessarily be present in the reference. I further understand that a single embodiment in the prior art must disclose each and every element of the challenged claim in order to anticipate. Disclosures from multiple, distinct embodiments of a prior art reference cannot be combined to anticipate the challenged claim.

d. Obviousness

26. I have also been advised that a patent claim is invalid if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been ***obvious*** to a POSITA as of the effective filing date of the patented claim. Obviousness can be established where the teachings of the prior art can be combined or modified to produce the claimed invention with a reasonable expectation of success. The result is only obvious if it would have been predictable to a POSITA having knowledge of all the relevant prior art. There must be a reasonable expectation that the combined elements will work to produce the claimed invention based on the disclosures of the prior art. I understand that the factors to be considered in determining obviousness are: (i) the scope and content of the prior art; (ii) differences between the prior art and the claims at issue; (iii) the level of ordinary skill in the field of the invention; and (iv) other objective factors, that indicate that the invention was or was not obvious, including

whether a teaching, suggestion, or motivation to create the invention existed before the invention was made, and whether the claimed invention applies a known technique that already had been used to improve a similar product or method in a similar way. Obviousness does not require absolute predictability, but there must be sufficient information in the art to provide a reasonable expectation of success at the time the invention was made.

e. Indefiniteness

27. I understand that each claim in a patent, when read in light of the patent's specification and its prosecution history, must inform those skilled in the relevant art of the scope of the claimed invention is with "reasonable certainty." "Reasonable certainty" means that a patent claim must be precise enough so that the public has clear notice of the scope of that claim and what remains uncovered by that claim. A patent claim that fails to define the scope of the claimed invention with reasonable certainty is invalid for ***indefiniteness***.

f. Written Description

28. A patent claim is invalid if the patent **l*acks an adequate written description*** of the claimed invention. The purpose of the written description requirement is to convey that the applicant invented the subject matter claimed as of the date of the filing to which he claims priority. The written description requirement is satisfied if the specification demonstrates to the public that the inventor possessed his or her invention as of the effective filing date of the patent. It is the written description *as filed* that must demonstrate that the inventor possessed his or her invention – information that the inventor did not include in his filing cannot support written description. The exact words found in the claim need not be used.

29. What is conventional or well known to a POSITA need not be disclosed in detail to satisfy the written description requirement which must be applied in the context of the particular invention and what was known in the art. If a skilled artisan would have understood the inventor

to be in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, then the written description requirement is met.

g. Enablement

30. I have been advised by counsel that for a claimed invention to be ***enabled*** the patent specification must describe how to make and use the claimed invention. Satisfying the enablement requirement requires that the patent specification, as of the time the application was filed, would have taught a POSITA how to make and/or use the full scope of the claimed invention without undue experimentation considering the following factors: (i) the time and cost of any necessary experimentation; (ii) how routine any necessary experimentation is in the art; (iii) whether the patent discloses specific working examples of the claimed invention; (iv) the amount of guidance presented in the patent; (v) the nature and predictability of the art; (vi) the level of ordinary skill in the art; (vii) the scope of the claimed invention; and (viii) the state of the prior art. It is the specification, not the knowledge of a POSITA, that must supply the novel aspects of an invention in order to constitute adequate enablement. I am advised that the extent of the guidance or direction needed to enable the invention is inversely related to the extent of knowledge in the art as well as predictability within the art. The more that is known in the prior art about the nature of the invention and how to make and use the invention and the more predictable the art is, the less the information that needs to be explicitly stated in the specification.

h. Patentable Subject Matter

31. I understand that Section 101 of the Patent Law provides: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." A patent claim is invalid if it reflects nothing more than an abstract idea or law of nature. If a claim is to an abstract concept, the validity depends on whether the

elements of the claims contain an "inventive concept" sufficient to transform the abstract idea into a technological invention.

VIII. SUMMARY OF THE PATENTS-IN-SUIT

32. The six patents-in-suit concern the operation of cable television systems. Three of the patents are asserted against Charter's set top boxes found in the homes of Charter customers. The other three patents are asserted against cable modems found in customer homes or against cable modem termination systems (CMTS) that are located at the headend of the cable system and communicate with the modems.

33. The '690, '008 and '826 patents concern monitoring of signal parameters to permit remote troubleshooting of signal quality. The '775, '682 and '362 patents concern improved cable system efficiency based on the signal to noise ratio profiles received from the modems. This allows more efficient servicing of like cable modems.

34. Detailed summaries of the six patents-in-suit are set forth in Charter's Responsive Claim Construction Brief (attached hereto as Exhibit 4), The Declaration of Dr. Kevin Almeroth Regarding Claim Construction (attached hereto as Exhibit 3), Charter's Technology Tutorial (attached hereto as Exhibit 5), and Charter's June 13, 2023 *Markman* Presentation (the slides from which are attached hereto as Exhibit 6), which are incorporated by reference including but not limited to their descriptions of the disclosures of the six patents-in-suit.

35. For the reasons stated herein, all asserted claims of all six patents in suit are invalid as anticipated and/or obvious. In addition, all asserted claims of all six patents in suit are invalid for lack of enablement and written description, and all asserted claims of the '690, '008, '826, '362 and '682 Patents are invalid because they are directed to unpatentable subject matter.

IX. The ’775 PATENT

a. Background and Admitted Prior Art

36. The ’775 Patent relates to what the inventors describe as a “gateway cable modem system and architecture” that “provides a highly flexible, high-performance system capable of handling multiple cable modem voice, data and networking services.” ’775 Patent, 1:60-65.

b. Summary of the Alleged Invention of the ’775 Patent

37. The ’775 patent, purports to solve various problems. The specification refers to the first as “functional partitioning” of various functions such as IP routing, network address translation (NAT)/firewall, virtual private network (VPN), web server and VoIP. *Id.,* 1:20-29. For this objective, the ’775 Patent envisions that a “data networking engine that performs data networking functions and a cable modem engine that performs all other cable modem functions” should be “completely partitioned” from each other. *Id.*

38. The ’775 Patent also claims to solve the problem of “flexibility” by “allow[ing] gateway cable modem[s] . . . to allow independent software development and field-upgrade of gateway value-added services and basic DOCSIS cable modem services.” *Id.,* 1:30-33.

39. Further, the ’775 Patent specification states that “performance” is another object of the invention. The specification states that the “gateway cable modem should be able to support a large number of simultaneous data application sessions originated from/terminated on multiple CPE (customer provided equipment) devices.” *Id.,* 1:41-47.

40. “Cost” is another purported objective of the ’775 Patent. The specification indicates that “[t]he gateway cable modem chip should have a small incremental hardware cost/functional increase relative to stand-alone cable modem chips.” *Id.,* 1:48-50.

41. Finally, the ’775 Patent indicates that “software re-use” is another objective, and the specification states that “existing software running on network processors should be easily portable to run on the gateway platform without major adaptation.” *Id.,* 1:53-55.

c. Priority Date / Date of Conception

42. The application that matured into the ’775 Patent was filed on September 30, 2003. It does not claim priority to any other patent application.

d. Claim Construction

43. I understand that the Court has construed the disputed terms of the ’775 as follows:

Term	Court’s Construction
“a data networking engine implemented in a first circuit that includes at least one processor . . .” (Claims 18-19) and	Plain meaning.
“a cable modem engine implemented in a second circuit that includes at least one processor . . .” (Claims 18-19)	Plain meaning.
“data bus” (Claims 18-19)	Plain meaning.
“wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine” (Claims 18-19)	“wherein the cable modem engine and the data networking engine are not necessarily physically separate but are functionally separate such that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine.”
“DOCSIS functions” (Claim 19)	Plain meaning.
“DOCSIS MAC processor” (Claims 18-19)	Plain meaning.
“DOCSIS controller” (Claims 18-19).	Plain meaning.

44. I have reviewed the Court’s constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the ’775 Patent.

e. Asserted Claims

45. I understand that Entropic accuses Charter of infringing claims 18 and 19 of the ’775 Patent. I discuss below my opinions on the validity of these claims.

f. Invalidity of the ’775 Patent Under 35 U.S.C. §§ 102 And 103

46. In my opinion, US 2004/0160945 A1 (CHARTER_ENTROPIC 00381592 – 00381607) (“Dong”) discloses or, at least in combination with US 2001/0039600 (CHARTER_ENTROPIC00217633 – 00217646) (“Brooks”), renders obvious claims 18 and 19 of the ’775 Patent. Dong was filed on February 13, 2003 and was published on August 19, 2004. Brooks was filed on February 16, 2001 an published on November 08, 2001.

47. Dong discloses a “network communication system with a stand-alone multi-media terminal adapter.” The invention provides “a stand-alone multi-media terminal adapter for coupling to a network access module over a communication link” with a network access module that “may be a cable modem and the communication link may be an Ethernet link or a USB link.” Dong [¶ 0013]. The network access module “communicates over a frame switched network with a network controller” and “requests reservation, commitment, and deletion of time division logical channels between the access module and the network controller over the frame Switched network.” *Id.* Additionally, “[t]he framed switched network may be a hybrid fiber/cable (HFC) network and the network controller may be a cable modem termination server (CMTS).” *Id.*

48. Brooks teaches a “cable modem having a programmable media access controller” (MAC). A single cable modem device includes all necessary MAC functions. The invention allows programmable MAC functions to support evolving standards (e.g., DOCSIS) without requiring expensive hardware upgrades. The invention teaches a “bifurcated microprocessor architecture, in which first processing circuitry is programmed to implement MAC functionality for processing information flowing to and from cable media interface circuitry, and second embedded processor

core or host system processor provides operating system functionality are used. Alternatively, separate processor cores provide MAC functionality for downstream and upstream data paths, respectively. Cable media interface circuitry, and other peripheral circuitry, are coupled to a peripheral bus that is linked by a bridge circuit to a system bus. The processing circuitry MAC is communicatively coupled to the system bus. Centralized DMA control directs data transfer between the peripheral and system buses as determined, at least in part, by the programmable MAC." Brooks at Abstract.

i. Claims 18 Is Invalid in View Of Dong in Combination with Brooks

1. [18pre]: A cable modem system comprising:

49. I understand that the preamble is not limiting and therefore should not be considered in assessing whether each limitation of claim 1 is taught by the prior art. To the extent the preamble is limiting, in my opinion Dong discloses or renders obvious this clam limitation.

50. Dong discloses "a stand-alone multi-media terminal adapter for coupling to a network access module over a communication link." Dong [¶ 0013]. Dong further teaches that "[t]he ***network access module may be a cable modem*** and the communication link may be an Ethernet link or a USB link." *Id.* (emphasis mine). Dong teaches that "[t]he framed switched network may be a hybrid fiber/cable (HFC) network and the network controller may be a cable modem termination server (CMTS)." *Id.*; *see also id.* [¶ 0035] ("FIG. 1 represents a system 10 for providing both Voice communications and Internet data connectivity to a subscriber over a frame Switched network such as a hybrid fiber/cable (HFC) network 12. The system 10 comprises a network controller Such as a cable modem termination server (CMTS) 20, an Internet gateway 22, and a call agent 24 interconnected by a managed IP network 14.").

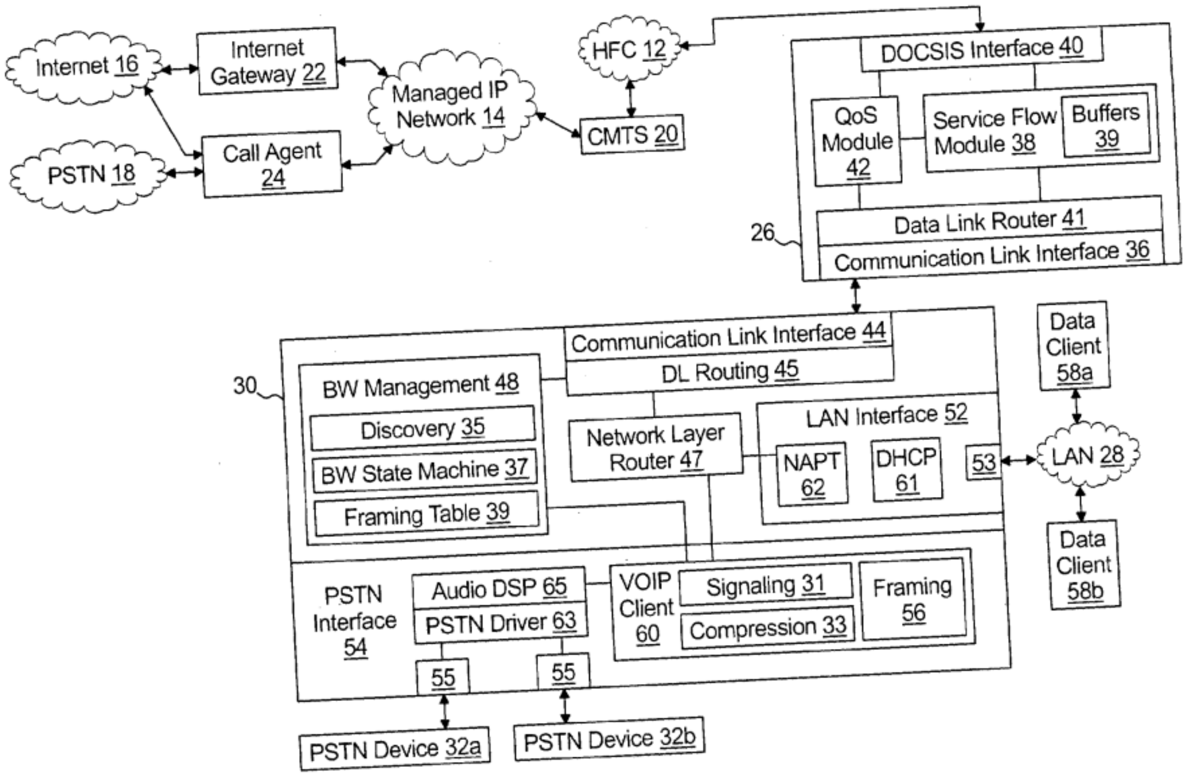
51. Dong also discloses that the cable modem may be "coupled to the HFC network 12 and a stand-alone multi-media terminal adapter (MTA)30 coupled to the cable modem 26 via a

communication link 34. Coupled to the MTA 30 are a plurality of internet data clients 58 and a plurality of PSTN devices 32 such as PSTN telephones or fax machines." *Id.* [¶ 0038].

52. As I discuss in more detail below, a POSITA would readily understand that the cable modem from Dong teaches and is equivalent to the "cable modem engine" from claim 18 of the '775 Patent, and the MTA from Dong teaches and is equivalent to the "data networking engine" of claim 18 of the '775 Patent.

2. [18a]: a data networking engine implemented in a first circuit that includes at least one processor, the data networking engine programmed with software that when executed by the at least one processor of the first circuit causes the data networking engine to perform home networking functions including interfacing with customer provided equipment;

53. Dong similarly discloses this limitation. With respect to the "first circuit" element, Dong describes the MTA as being a "stand alone" device that couples to the network access module (*i.e.*, the cable modem engine) via a communication link, which is coupled to a cable modem. *Id.* [¶ 0013] ("A first aspect of the present invention is to provide a stand alone multi-media terminal adapter for coupling to a network access module over a communication link. The network access module may be a cable modem and the communication link may be an Ethernet link or a USB link."). A POSITA would readily understand that Dong teaches that the data networking engine (*i.e.*, the MTA) is implemented in the "first circuit" and that, as discussed below, the cable modem is implemented in a separate "second circuit" that is portioned from the "first circuit." Figure 1 from Dong makes this clear, with element 30 in the figure representing the MTA and element 26 representing the cable modem:



Id., FIG. 1. I will discuss the partitioning between these two elements in subsection IX.f.i.4.

54. A POSITA would further understand that the MTA may be implemented with "at least one processor" that is "programmed with software." As a preliminary matter, I observe it is a routine practice in the art to accomplish the functions of the "data networking engine" with software and "one or more processors." Indeed, Dong reflects this common practice:

> It should also be appreciated that many of the elements discussed in this specification may be implemented in a hardware circuit(s), a processor executing software code, or a combination of a hardware circuit(s) and a processor or control block of an integrated circuit executing machine readable code. As such, the term circuit, module, server, or other equivalent description of an element as used throughout this specification is intended to encompass a hardware circuit (whether discrete elements or an integrated circuit block), a processor or control block executing code, or a combination of a hardware circuit(s) and a processor and/or control block executing code.

Id. [¶ 0034].

55. The MTA performs the "home networking functions" of claim 18's "data networking engine . . . including interfacing with customer provided equipment." For example, Dong states that "[t]he multi-media terminal adapter comprises a PSTN interface which generates subscriber loop signaling and media communications to a PSTN end user device and a VoIP module coupled between the PSTN interface and a communication link to the access module." Dong [¶ 0014]. This describes an interface from the MTA to customer land-line telephone equipment.

56. Dong discloses that the MTA comprises a "LAN interface."[2] *Id.* [¶ 0069]. Per Dong, this module "comprises one or more network ports 53, an address server (e.g. DHCP server) 61, and a network address and port translation server 62 which in combination operate as a root node of a local IP network 28 and enables Internet connectivity to multiple data clients 58 through the port(s) 53 utilizing only a single IP address assigned to the MTA 30." *Id.* [¶ 0073]. A POSITA would readily understand that this is the means by which home networking functions (e.g. routing or DHCP) are performed. The LAN interface links the "customer provided equipment" (e.g. land line telephone, routers/switches, or computers) to the "data networking engine."

57. The '775 Patent itself describes LAN communications as being part of the home networking functionality of the data networking engine:

> As seen in FIG. 1, data networking engine is capable of additional CPE functionality such as Ethernet, USB and other ***LAN I/F communications*** (802.11, Bluetooth, Powerline, etc.), with appropriate CPE drivers 254, 256, 258 being provided to support such communications.

'775 Patent, 3:63-67; *see also id.,* 1:43-44 (defining CPE as "customer provided equipment").

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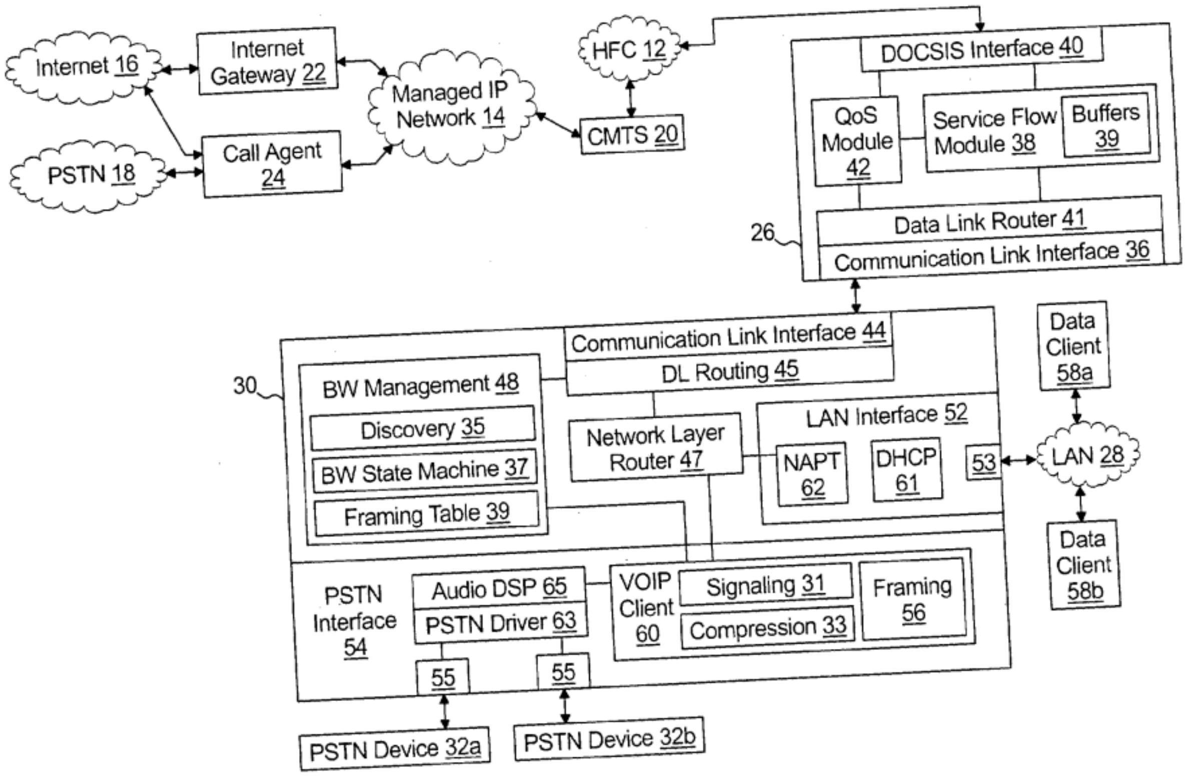
[2] LAN is short for "Local Area Network."

58. It is therefore my opinion that Dong discloses this limitation, or at least renders it obvious.

3. [18b] a cable modem engine implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit, the cable modem engine programmed with software that when executed by the at least one processor of the second circuit causes the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, the cable modem functions including interfacing with cable media, and the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine, the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and

59. Dong similarly discloses or suggests this. With respect to the "second circuit" element, Dong describes the network access module (*i.e.*, the cable modem engine) as being its own "module," which is coupled to the MTA via a "communication link." *Id.* [¶ 0013] ("A first aspect of the present invention is to provide a stand alone multi-media terminal adapter for coupling to a network access module over a communication link. The network access module may be a cable modem and the communication link may be an Ethernet link or a USB link."). A POSITA would readily understand that Dong teaches that the cable modem engine is implemented in the "second circuit" and that, as discussed below, this "second circuit" is partitioned from the "first circuit" containing the data networking engine. Figure 1 from Dong makes this clear, with element 30 in the figure representing the MTA and element 26 representing the cable modem:



Id., FIG. 1. I will discuss the partitioning between these two elements in Section IX.f.i.4.

60. As previously mentioned in Section IX.f.i.2 of this Report, a POSITA would readily understand that the elements of Dong, such as the cable modem, are made functional through processors and that they are "programmed with software." *See* Dong [¶ 0034]. One such controller may be a DOCSIS MAC processor.[3] While Dong does not explicitly use the term "DOCSIS MAC processor" MAC processors were well known in the art as of the priority date of the '775 Patent. Dong teaches that the DOCSIS Interface 40, in Figure 1 of Dong, implements the following:

> The DOCSIS interface 40 utilizes the known DOCSIS protocols for communicating with the CMTS 20 over the HFC network 12. The communications may include exchanging IP frames that are part of IP sessions between the MTA 30 and a remote internet server; IP frames that are part of VoIP sessions between the MTA 30 and

[3] "MAC" is understood in the art to stand for Media Access Control.

the call agent 24, and DOCSIS-DQoS control commands between the cable modem 26 and the CMTS 20.

61. A POSITA would understand these functions, performed by the DOCSIS Interface as those that would be performed by the DOCIS MAC processor. Additionally, a POSITA would also understand that, in conjunction with the DOCSIS Interface, additional functions are implemented, "datalink layer router 41 routes bandwidth management frames to the QoS module 42 and routes IP traffic to the service flow module 38 based on the EtherType field of each frame received on the communication link 34." *Id.* [¶ 0044].

62. In view of Dong's instruction that certain elements may be achieved via the use of processors, a POSITA would understand that a features contained in a DOCSIS MAC processor would be accomplished by the cable modem functionality in the DOCSIS Interface. *See* Dong [¶ 0046].

63. Dong instructs that the cable modem "may include a DOCSIS Interface 40, a QoS module 42, a service flow module 38, a datalink layer router 41, and a communication link interface 36." Dong [¶ 0043]. Dong also states that the "DOCSIS Interface 40 utilizes known DOCSIS protocols for communicating with the CMTS over the HFC network." Dong [¶ 0046]. A POSITA would understand that the DOCSIS Interface of Dong would also contain the DOCSIS Controller functions taught in the '775 Patent.

64. The prior art, Brooks, discloses that cable modems were able to upgrade themselves independent of the data networking engine. Brooks, for example, discloses "a cable modem [that has] a programmable media access controller (MAC). In one embodiment of the invention, a single cable modem device is provided that includes all necessary MAC functions. The cable modem device advantageously allows the MAC functions to be programmed to support evolving standards (e.g., DOCSIS) without requiring expensive hardware upgrades." Brooks [¶ 0013], *see also id.* [¶¶

0016, 0024]. A POSITA would understand that this ability to program the MAC functions to support evolving standards to disclose "the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine." A POSITA would understand that this remote programmability functionality to deliver software upgrades could easily be integrated into the DOCSIS Interface of Dong. Remote software upgrades were well known to the industry far in advance of the priority date of this patent.[4]

65. Finally, the limitation calls for the DOCSIS MAC processor to "be configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput."[5] A POSITA would understand that DOCSIS Interface of Dong includes both DOCSIS MAC and DOCSIS Controller functionality. Both the Court and Entropic's Expert, Dr. Kramer, acknowledge that the MAC and Controller can be within one processor. Kramer

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[4] For example, many home computers were using remote software updates at least as early as 1997 when Windows released Internet Explorer 4, per the history of Internet Explorer that Microsoft published on its website in 2005:

> Windows such as Active Desktop (Windows Desktop Update), Channels, Frontpage Express, Netshow, Web Publishing Wizard, Microsoft Chat 2.0 and various multimedia enhancements, including Real Player from Progressive Networks. Internet Mail and News was replaced by Outlook Express 4.
>
> Active Desktop allowed users to set web pages and other internet content as their desktop wallpaper, whilst Channels were essentially an interactive link between various web sites and computer users. Channels could be used as screen savers, and could be viewed within Internet Explorer or as a desktop item. The content of the Channels could be updated by the publishers at will.

Sandi Hardmeier, *The History of Internet Explorer*, Microsoft.com (Aug. 25, 2005), archived at https://web.archive.org/web/20051001113951/http://www.microsoft.com/windows/IE/community/columns/historyofie.mspx.

[5] "PDU" stands for "protocol data unit" and refers to a unit of information delivered through a network layer. A POSITA would understand the term "packet" to be a shorthand for the term "PDU packet."

Declaration ¶¶ 95-99 ("Thus, in my opinion, a POSITA would be able to ascertain the scope of Claim 18 with reasonable certainty and would not misinterpret the 'DOCSIS MAC processor' and 'DOCSIS controller' functional blocks as limited to separate, specific physical processors."); Claim Construction Memorandum Opinion and Order, Dkt. 123 at 23-25 (June 26, 2023) ("CC Order").

66. Given that the Court's construction that there is no clear distinction between the DOCSIS MAC functions and the DOCSIS Controller functions ("the absence of involvement of the DOCSIS Controller in this particular operation does not preclude the DOCSIS Controller from being involved with other MAC functions") a POSITA would understand that packets could be forwarded to the data networking engine without the involvement of the DOCSIS Controller by a "re-definition" of functional ownership. CC Order at 24. The Court's construction of DOCSIS MAC and DOCSIS Controller is "plain and ordinary meaning." *Id.* at 25.

67. Given that a POSITA would understand that there is no clear functional delineation between the two terms, when considering Dong, that packet forwarding functionality could be identified as a MAC function. In fact, the specification of the '775 Patent clearly identifies that the MAC supports all DS PDU packets are processed without the controller. '775 Patent, 3:1-38. A POSITA would understand that there is no technological reason that the processed downstream PDU packets of this limitation cannot be forwarded, in Dong, directly to the data networking engine "without the involvement of DOCSIS controller".

68. It is therefore my opinion that Dong discloses or renders this limitation obvious.

4. [18c] a data bus that connects the data networking engine to the cable modem engine, wherein the cable modem functions performed by the cable modem engine are completely

partitioned from the home networking functions performed by the data networking engine.

69. It is important to note that the ’775 Patent does not define the term “data bus.” Nevertheless, it is well-understood in the art to refer to it as a component within a computer or device that transfers data between different components in a computer or between different computers. Dong refers to this as the “communication link”:

> The system further includes, at each customer’s premises, a network access module Such as a cable modem 26 coupled to the HFC network 12 and a stand alone multi-media terminal adapter (MTA) 30 ***coupled to the cable modem 26 via a communication link 34***. Coupled to the MTA 30 are a plurality of internet data clients 58 and a plurality of PSTN devices 32 such as PSTN telephones or fax machines.

Dong [¶ 0038] (emphasis mine).

70. Dong further instructs a POSITA as to how this communication link should be established:

> The communication link interface 36 utilizes one of a plurality of known physical layer protocols for exchanging frames with the MTA 30 over the communication link 34. Exemplary protocols include Universal Serial (USB) and Ethernet. The frames transferred between the communication link 36 and the MTA 30 may be IP traffic (e.g. IP sessions between a data client 58 and a remote Internet server or VoIP signaling or media sessions between the MTA 30 and the call agent 24) or may be bandwidth management frames (e.g. general management information, bandwidth management instructions, and acknowledgements) transferred between the MTA 30 and the OOS module 42.
>
> . . .
>
> The communication session with the MTA 30 is established using discovery processes similar to those utilized by the point-to-point over Ethernet (PPoE) standard. More specifically, Step 114 represents receiving a broadcast discovery message from the MTA 30 that is routed to the QoS module 42 by the datalink layer router 41 because it includes an EtherType that distinguishes it from frames to be routed to the service flow module 38 (e.g. EtherType field 0xAAO1). The MAC address of the MTA 30 will be included within the discovery message.

Id. [¶¶ 0044, 51].

71. Dong also instructs the POSITA how to maintain the data bus/communication link:

> Once the session is established, at various times a management event will occur. The MTA30 will periodically send a “heart beat' message to the cable modem 26 which enables the MTA30 to periodically verify that the session has not been interrupted. Receipt of a "heartbeat' message is a management event. Other management events include determining that a time of day message should be sent to the MTA 30, determining that a Syslog ID message should be sent to the MTA30, and determining that a DHCPID should be sent to the MTA30. Step 112 represents a determination if management event has occurred. If yes, Step 113 represents responding to the MTA 30 with an appropriate management message.

Id. [¶ 0053].

72. The communication link that Dong teaches is necessary because, as I stated above in Sections IX.f.i.2 and IX.f.i.3, Dong instructs that the data networking engine and the cable modem engine are functionally separate.

73. It is therefore my opinion that Dong discloses or renders this limitation obvious.

ii. Claims 19 Is Invalid in View Of Dong in Combination with Brooks

1. [19] A cable modem system as claimed in claim 18, wherein all DOCSIS functions are localized in the cable modem engine.

74. As I discussed above, Dong in combination with Brooks would have rendered claim 18 obvious. *See supra* at Section IX.f.i.

75. While Dong does not explicitly state this language, all DOCSIS functionality disclosed by Dong is handled by the cable modem, not the MTA. For example, Dong discloses:

> The DOCSIS interface 40 utilizes the known DOCSIS protocols for communicating with the CMTS 20 over the HFC network.

Id. [¶ 0046]

> Because the HFC network 12 is bandwidth limited-particularly for the transfer of IP frames from the cable modem 26 to the CMTS 20, known dynamic quality of service protocols (DOCSIS-DQoS protocols) provide capability for a cable modem 26 to make requests to the CMTS 20 for the reservation, commitment, and deletion of time division logical channels over the HFC network 12.

Id. [¶ 0040].

> In a DOCSIS network, a device known as an embedded multi-media terminal adapter (MTA) interfaces with the DOCSIS network and emulates a PSTN Subscriber loop on the twisted pair network at the customer's premises. The embedded MTA may request a dedicated time slot from the CMTS upon initiating a telephone call, receive an assigned time slot in an acknowledgement from the CMTS, and thereafter format frames representing the telephone call to fit the period of the time slot and exchange the frames over the HFC network during the time slot. A problem with use of an embedded MTA is that it obsoletes current cable modems that do not include embedded MTA capability.
>
> A device known as a stand alone MTA also has been contemplated. The stand alone MTA will connect to a known DOCSIS cable modem that does not include embedded MTA capability. A problem with the stand alone MTA architecture is that the MTA cannot communicate directly with the cable modem-the cable modem operates only as a conduit routing frames directly between the MTA and the CMTS.
>
> . . . A need exists for a stand alone MTA system that enables direct communication between the cable modem and the MTA and, more specifically, enables the MTA to control the dynamic quality of Service function of the cable modem.

Id. [¶¶ 0009-12].

76. It is therefore my opinion that Dong discloses or renders this limitation obvious.

g. Invalidity Under 35 U.S.C. § 112.

77. Claim 18 of the '775 patent recites "a data networking engine implemented in a first circuit" that "perform[s] home networking functions" and "a cable modem engine," implemented in a second circuit that is "separate from the first circuit," that "perform[s] the cable modem functions." In construing the claim, the Court concluded that even though the claim describes "the second circuit" as "being separate from the first circuit," "the 'first circuit' and 'second circuit' need not be physically separated." Claim Construction Order at 11. The Court further interpreted the claim phrase "wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine" to mean "wherein the cable modem engine and the data networking engine are not necessarily physically separate but are functionally separate such that the cable

modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine." *Id.* at 17.

78. In my opinion, the patent does not enable or provide written description support for the full scope of the invention as so construed. The patent provides no disclosure of how or in what respect the circuits can be deemed "separate," yet not be physically separate. In fact, although the term "circuit" appears in the claims of the '775 patent, it is absent from the specification. The patent provides no disclosure of how or in what way "the cable modem functions performed by the cable modem engine [can be] completely partitioned from the home networking functions performed by the data networking engine" if the cable modem engine and data networking engine are not physically separate. The specification describes only physical separation.

79. Additionally, although the court ruled that a DOCSIS MAC and a DOCSIS Controller are well known by those of ordinary skill in the art, I disagree. The court itself stated "the absence of involvement of the DOCSIS controller in this particular operation does not preclude the DOCSIS controller from being involved with other MAC functions." Consistent with the court's statement, the industry itself has a general sense of what these terms mean, but provides no clear delineation between the two.

80. The specification does not describe or enable a DOCSIS MAC processor or DOCSIS controller that are not the DOCSIS MAC processor and DOCSIS controller described in the specification. There is not any written description or enablement of how to perform the claim limitation "the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller…" unless the claimed DOCSIS MAC processor and DOCSIS controller are those described in the specification. Unless the claimed DOCSIS MAC processor and DOCSIS

controller are those described in the specification, there is no way to distinguish a DOCSIS MAC processor from a DOCSIS controller, and the DOCSIS controller cannot be bypassed. The issues associated with this are detailed in Charter's claim construction-related submissions.

81. Claim 18 states that the data networking engine is implemented in a circuit that "includes at least one processor." In the disclosed embodiment, the data networking engine itself is one and *only* processor (*e.g.* element 120 Fig. 1;4:25-27). The specification does not otherwise describe a data networking engine that is anything more than a single processor. Accordingly, the patent lacks written description support for and does not enable the full scope of the claim.

82. In addition, Claim 18 recites a cable modem engine that includes "at least one processor," further specifying that the cable modem engine "includes a DOCSIS controller and a DOCSIS MAC processor." However, there is no support in the specification for a cable modem engine having only one processor as is covered in the claim. Indeed, the specification provides no support for a DOCSIS controller and a DOCSIS MAC processor that are not separate processors.

83. Claim 19 of the '775 patent depends from claim 18 and further requires that "all DOCSIS functions are localized in the cable modem engine." In its Claim Construction Order, the Court rejected Charter's argument that the existence of claim 19 forced the Court "to arrive at a narrow interpretation of cable modem engine." Claim Construction Order. However, there is no written description support or enablement for a cable modem engine that does not perform all cable modem functions, including all DOCSIS functions.

84. Claim 18 also requires a cable modem engine "configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine." The specification does not provide an enabling disclosure of how to accomplish this,

particularly if there is no physical separation of the cable modem engine and the data networking engine.

h. Objective Indicia of Non-Obviousness Regarding the ' 775 Patent

85. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the '775 Patent that I provided above. I understand that Charter has requested Entropic's positions regarding secondary considerations and objective indicia, to which Entropic did not provide any response. To the extent Entropic provides additional information regarding the claims of the '775 Patent, I reserve the right to amend my opinions in response.

X. The '690 PATENT

a. Background and Admitted Prior Art

86. U.S. Patent No. 8,284,690 (ENTROPIC_CHARTER_0000222 – 0000236) (the "'690 Patent") contains a section entitled "Description of the Related Art" which provides technical background and summarizes the supposed technical problem that the patentee sought to address. '690 Patent, 1:16-62. According to the '690 Patent, as the number of available subscriber services (such as the delivery of multimedia content, streaming audio, and streaming video) has increased, there has been a corresponding increase in the number devices being connected to home networks. *Id.*, 1:23-26. This, according to the '690 Patent, "increases the complexity of coordinating communication between … network nodes." *Id.*, 1:25-27. This increased complexity, the patent describes, increases the likelihood of occurrence of network problems, which would necessitate dispatching technicians to subscriber homes to diagnose the problems. *Id.*, 1:30-40.

87. The '690 Patent recognized the utility of using what was known in the art as "channel assessment probes," *id.*, 1:12-14, which, according to the patent, "is helpful to

characterize the communication channel[6] over which data is to be sent between nodes of the network." *Id.*, 1:41-43. As described, "probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node." *Id.*, 1:49-53. The '690 Patent states that "[t]hese probes are typically well defined. Accordingly, the receiving node knows before reception what reference signal was transmitted. By comparing the reference probe with the actual received probe, the receiver can determine some of the characteristics of the channel between the transmitting and receiving node." *Id.*, 1:52-57.

88. The patentee, however, perceived a supposed drawback associated with requiring a transmitting node to send a "predetermined probe," namely, a reduction in "the amount of flexibility of the characterization process." *Id.*, 1:57-59.

b. Summary of the Alleged Invention of the '690 Patent

89. As a solution to the alleged problem, the '690 patent, entitled "Receiver Determined Probe," discloses a supposed improvement to the known process of transmitting information about a communications channel between two nodes within a network. According to the alleged invention, the receiving node may generate "a probe request that specifies a plurality of parameters to be used in … a 'receiver determined' probe to generate a probe having the 'form' specified by these parameters." *Id.*, 2:3-6.

90. The specification defines a "probe request" as specifying "a plurality of parameters associated with the generation and transmission of a probe, including the content of a payload of the probe." *Id.*, 2:6-9. In an embodiment, the parameters further include:

---

[6] The '690 Patent defines "channel" as "the communication link between a first node of a network and a second node of a network in one particular direction." '690 Patent, 1:43-47.

> the modulation profile for the probe; the payload content of the probe; the number of times to transmit the probe; the number of symbols for the payload of the probe; the preamble type for the probe; the cyclic-prefix length for the payload of the probe; the transmit power for the probe; and the transmit power scaling factor for the payload of the probe.

Id., 2:10-16. In this way, "the probe that is transmitted in response to the probe request will have a form dictated by the parameters specified in the probe request." *Id.*, 2:17-19.

c. Prosecution History of the '690 Patent

91. The '690 Patent was filed on December 10, 2009. The '690 Patent claims priority to two provisional applications: U.S. Provisional Application No. 61/122,687 (ENTROPIC_CHARTER_0002334 – 0002350 (the "'687 Application"), filed on December 15, 2008; and U.S. Provisional Application No. 61/179,454 (ENTROPIC_CHARTER_0002367 – 0002385 (the "'454 Application"), filed on May 19, 2009.

92. In a December 21, 2011 Non-final Office Action, the USPTO rejected all pending claims as either anticipated by U.S. Patent Application Publication No. 2008/0117833 ("Borran") or as obvious over Borran in view of U.S. Patent No. 7.124,199 ("Miller"). '690 File History at ENTROPIC_CHARTER__0000327 - 0000351.

93. In response, on May 21, 2012, the applicant, among other things, amended independent claims 1 and 9 to recite a "first" and "a second" plurality of parameters. For example, claim 1 was amended to recite:

> "a) … wherein the first plurality of parameters at least specify content payload of the probe and a second node;"
>
> "b) determining a second plurality of parameters associated with generation and transmission of the probe;"
>
> "c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters"

Id. at ENTROPIC_CHARTER__0000360.

94. The applicant amended claim 9 to recite, among other things, "wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node." *Id.*, at ENTROPIC_CHARTER_0000361.

95. In arguing that the amended claims distinguish over the prior art (specifically, Borran), the applicant highlighted that Borran is "completely silent regarding '**a probe request** specifying a first plurality of parameters associated with the generation and transmission of a probe … and mentions nothing of 'determining **a second plurality of parameters** associated with generation and transmission of [a] probe' and 'generating [a] probe in accordance with [a] first plurality of parameters and [a] second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters." *Id.*, at ENTROPIC_CHARTER_0000366 (emphases in original).

96. The applicant also stated that independent claim 9 is also "patentable over Borran for at least the same reasons provided … with respect to claim 1." *Id.*, at ENTROPIC_CHARTER_0000367. The applicant stated that "Miller fails to cure the deficiencies of Borran," arguing that the claims to which the examiner applied Miller were also patentable. *Id.*

97. I note the applicant did not point to anything in the '690 Patent's specification or drawings that corresponds to or supports the newly recited "second plurality of parameters," nor can I discern anything in the specification that corresponds to the recited "second plurality of parameters."

98. On June 11, 2012, the USPTO issued a Notice of Allowance, allowing all pending claims. *Id.*, ENTROPIC_CHARTER_0000378 - 0000384. The examiner stated as his reasons for allowance:

> The present invention is directed to a method for generating a probe in a network. The prior arts in the record fail to teach or make obvious to a method comprising

> ***generating the probe in accordance with the first plurality of parameters and the second plurality of parameters*** within a structure of the claim. These features are claimed in the independent claims 1, 9 and 17 and render them allowable.

Id., ENTROPIC_CHARTER_0000383 (emphasis mine).

d. Priority Date / Date of Conception

99. The ’690 Patent “claims the benefit” of the ’687 Application and the ’454 Application. ’690 Patent, 1:6-9. It is my understanding that Entropic maintains that the ’690 Patent is entitled to priority of these applications.

100. Based on my review, it is my view that the ’690 Patent is not entitled to claim priority to the ’687 Application, that is, the ’690 Patent is not entitled to a priority date of December 15, 2008.

101. For example, independent claims 1, 9, and 17 (the only independent claims of the ’690 Patent) require determination of a second plurality of parameters, whereby generation of a probe is performed in accordance with a first plurality of parameters and the aforementioned second plurality of parameters. *Id.*, 13:45-58 (claim 1), 14:17-27 (claim 9), 14:59-15:15 (claim 17). I have reviewed the ’687 Application and that application fails to disclose anything pertaining to generation of a probe in accordance with a first plurality of parameters and a separately determined second plurality of parameters. Therefore, it is my opinion the ’687 Application does not contain a written description in full, clear, concise, and exact terms such as to enable an ordinarily skilled artisan to practice the invention claimed in the ’690 Patent.

102. Additionally, it is my opinion that the ’690 Patent is not entitled to claim priority to the ’454 Application and is therefore not entitled to claim the benefit of its May 19, 2009 filing date. Indeed, as I explained above with respect to the ’687 Application, the ’454 Application similarly fails to disclose anything pertaining to generation of a probe in accordance with a first plurality of parameters and a separately determined second plurality of parameters. Therefore, it

is my opinion that, like the ’687 Application, the ’454 Application does not contain a written description in full, clear, concise, and exact terms such as to enable an ordinarily skilled artisan to practice the invention claimed in the ’690 Patent.

103. That said, the references discussed in this Report constitute prior art to the ’690 Patent as of the filing date of its nonprovisional application or either the ’687 and ’454 Applications.

e. Claim Construction

104. I understand that the Court has construed the disputed terms of the ’690 Patent as follows:

Term	Court’s Construction
“probe” (Claims 1, 7-9, 11)	“a signal transmitted to a network node that the network node can compare to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted”
“probe request” (Claims 1, 7-9, 11, 15, 16)	“a request, sent by one network node to another network node, that specifies the form of a probe to be generated and transmitted”
“generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters” (Claim 1)	Plain meaning.
“physical layer probe” (Claim 9)	Plain meaning (apart from the Court’s construction of “probe,” above).
“the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe” (Claim 9)	Plain meaning.
“wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters	Plain meaning.

determined by the second node" (Claim 9)	

CC Order at 62-63.

105. I have reviewed the Court's constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the '690 Patent.

f. Asserted Claims

106. I understand that Entropic accuses Charter of infringing claims 1, 7-9, 11, 15, and 16 of the '690 Patent. I discuss below my opinions on the validity of these claims.

g. Invalidity of the '690 Patent Under 35 U.S.C. §§ 102 And 103

107. In my opinion, Claims 1, 7-9, 11, 15, and 16 of the '690 Patent are invalid as anticipated and/or obvious in view of Data-Over-Cable Service Interface Specifications, DOCSIS 2.0, Radio Frequency Interface Specification, Document Control No. CM-SP-RFIv2.0-I12-071206 (CHARTER_ENTROPIC00380721 – 00381260) ("DOCSIS 2.0") alone or in combination with *Modern Cable Television Technology, Video, Voice, and Data Communications*, 2nd Edition by Walter Ciciora et al. (Elsevier 2004) (CHARTER_ENTROPIC00044357 – 00045456) ("Ciciora").

108. The version of DOCSIS 2.0 on which I rely was issued by CableLabs on December 6, 2007. DOCSIS 2.0 at ii.[7] I note that version 2.0 of the DOCSIS specification was issued well before the priority date of the '690 Patent. *See, e.g.*, '775 Patent, 2:58-60 (referencing a "DOCSIS 2.0-compliant PHY" in connection with the disclosed embodiment in the '775 Patent, which was

[7] For brevity, I cite to the page numbers set forth in DOCSIS 2.0 rather than the Bates numbers affixed by Charter.

filed in September 2003). I also note that the version of DOCSIS 2.0 on which I rely is available for download from the CableLabs website from the web page https://www.cablelabs.com/specifications/radio-frequency-interface-specification-2. On that web page, the DOCSIS 2.0 version on which I rely is designated as Version I12, having a publication date of December 6, 2007, and which can be downloaded using the download link https://community.cablelabs.com/wiki/plugins/servlet/cablelabs/alfresco/download?id=ccd85123-cc7b-4768-89dd-9b6cbc62d57d. I have reviewed Data-Over-Cable Service Interface Specifications, DOCSIS 2.0, Radio Frequency Interface Specification, Document Control No.CM-SP-RFIv2.0-I11-060602 (CHARTER_ENTROPIC00479650 – 00480185), which was published by CableLabs on June 2, 2006, and which has, for the purposes of this report, an identical disclosure as the DOCSIS 2.0 reference that I cite herein. The foregoing document was available to the public at least as far back as July 28, 2007, as confirmed by the Internet Archive: https://web.archive.org/web/20070728102259/http://www.cablemodem.com/downloads/specs/CM-SP-RFI2.0-I11-060602.pdf.

109. Ciciora was published in 2004 by Elsevier, Inc. I have reviewed the Expert Report of Dr. Sylvia Hall-Ellis, which arrived at the conclusion that Ciciora was publicly available at least as early as February 17, 2004. *See generally* Exhibit 7 (Expert Report of Sylvia D. Hall-Ellis, Ph.D. and attachments and exhibits thereto).

i. Claims 1, 7-9, 15, and 16 Are Invalid Over DOCSIS 2.0

110. In my opinion, as discussed in further detail below, DOCSIS 2.0 discloses claims 1, 7-9, 15, and 16.

1. [1pre]: "A method comprising:"

111. I understand that the preamble is not limiting and therefore should not be considered in assessing whether each limitation of claim 1 is taught by the prior art. To the extent the preamble is limiting, in my opinion DOCSIS 2.0 discloses or suggests this claim limitation.

112. DOCSIS 2.0 discloses an "Upstream Channel Descriptor" (or "UCD"), which is "transmitted by the CMTS as a periodic interval to define the characteristics of an [sic] logical upstream channel." DOCSIS 2.0, at 135. In response, depending on parameters specified in the UCD, the CM transmits "Ranging Request" (or RNG-REQ). *Id.* at 139 (specifying that if "Ranging Required" is set to 1 or 2, then the CM (cable modem) must perform ranging).

113. In my view, the CMTS, by sending the UCD to the CM, and the CM, by sending the ranging request in response, are carrying out a method, as such a term would be understood by a POSITA within the context of the '690 Patent.

2. [1a]: "a) receiving in a first node, a probe request specifying a first plurality of parameters associated with the generation and transmission of a probe, wherein the first plurality of parameters at least specify content payload of the probe and a second node;"

114. In my opinion, DOCSIS 2.0 discloses or suggests this limitation.

115. DOCSIS 2.0 discloses that a cable modem (or CM), which corresponds to the recited first node in this claim, receives a UCD from a CMTS. DOCSIS 2.0, for example, discloses that a CM transmits a RNG-REQ message that includes a "Downstream Channel ID." *Id.* at 147. As disclosed by DOCSIS 2.0, the Downstream Channel ID is "[t]he identifier of the downstream channel on which ***the CM received the UCD***." *Id.*

116. In my view, a DOCSIS 2.0 UCD is a "probe request" within the meaning of the '690 Patent, and consistent with the Court's construction of the term. I understand that the Court

has construed "probe request" as "a request, sent by one network node to another network node, that specifies the form of a probe to be generated and transmitted." CC Order at 45.

117. First, a POSITA would have understood that the UCD is a "request" that is sent by one network node (in this case, a CMTS) to another network node (a CM). My opinion is informed by the fact that parameters of the UCD request a CM to perform an action. For example, as I discussed above, the UCD includes a "Ranging Required" parameter. This parameter, along with other parameters of the UCD, is depicted below:

Table 8-18 Channel TLV Parameters (Continued)

S-CDMA Timestamp Snapshot[2]	14	9	Snapshot of the timestamp, mini-slot, and S-CDMA frame taken at an S-CDMA frame boundary at the CMTS. A new value MUST be sampled and sent with each UCD message. Refer to Section 6.2.11.2, "Mini-slot Numbering," on page 54. This TLV MUST be present if S-CDMA Mode is enabled, and MUST NOT be present if it is not.
Maintain Power Spectral Density	15	1	1=on;2=off. If this value is on and the modulation rate is different from the previous UCD, the CM MUST change its transmit power level to keep the power spectral density as close as possible to what it was prior to the modulation rate change. If this value is off or this parameter is omitted then the CM maintains the same power level that it was using prior to the modulation rate change. In any case the effect of this parameter only lasts until the CM receives a power adjustment in a RNG-RSP.
Ranging Required	16	1	0= no ranging required 1= unicast initial ranging required 2= broadcast initial ranging required If this value is non-zero and the UCD change count does not match the UCD currently in effect, the CM MUST perform ranging as specified by this TLV before using any other transmit opportunities with the new UCD parameters. If ranging is required, and the CM is already registered, then it MUST maintain its SIDs and not re-register. If this value is 0 or this TLV is omitted, no ranging is required.

Id., at 139. In my opinion, a POSITA would have understood that the UCD, by specifying a 1 or 2, requests that a RNG-REQ message be sent by the CM.

118. In my opinion, the DOCSIS 2.0 UCD specifies the form of a probe to be generated and transmitted. As I discuss below, a DOCSIS 2.0 RNG-REQ is a "probe" within the meaning

of the '690 Patent and the Court's construction of that term. The UCD specifies the "form" of the RNG-REQ.

119. The DOCSIS 2.0 UCD is depicted below:

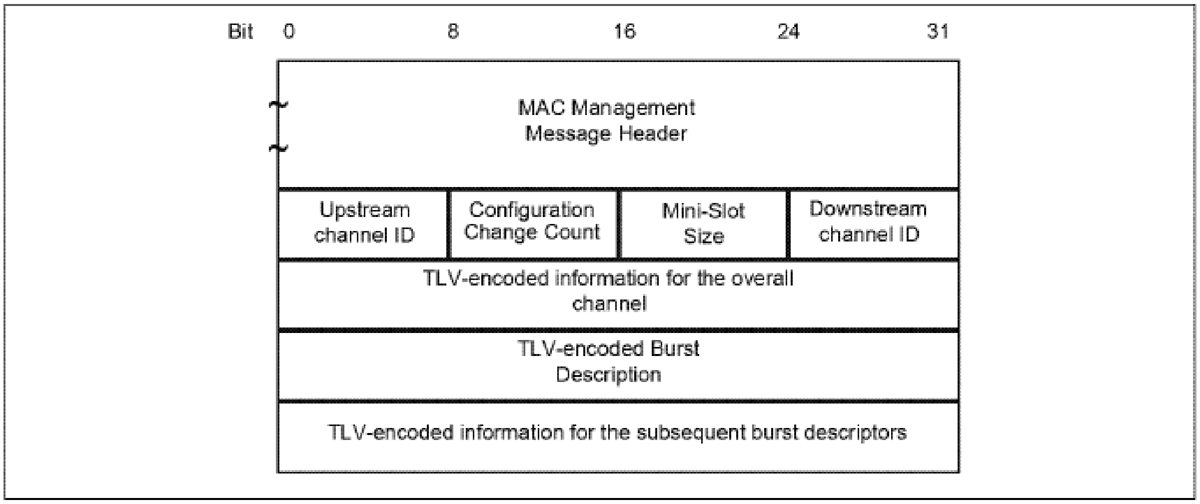

Figure 8-16 Upstream Channel Descriptor

Id. at 136 (Figure 8-16).

120. As depicted, the UCD contains various sections: a MAC Management Message Header; an Upstream channel ID; a Configuration Change Count; a Mini-Slot Size; a Downstream channel ID; and TLV-encoded information for: the overall channel; a Burst Description; and for subsequent burst descriptors.

121. According to DOCSIS 2.0, the Channel TLV parameters of the UCD include, for example, a modulation rate and an upstream frequency:

Table 8-18 Channel TLV Parameters

Name	Type (1 byte)	Length (1 byte)	Value (Variable length)
Modulation Rate	1	1	Multiples of base rate of 160 kHz. (Value is 1, 2, 4, 8, 16, or 32.) A value of 32 means that this is a DOCSIS 2.0 Only Upstream. If S-CDMA mode is enabled then this parameter MUST have a value of 8, 16 or 32.
Frequency	2	4	Upstream center frequency (Hz)

Id. at 137.

122. The UCD parameters include a preamble pattern and a burst descriptor:

Table 8-18 Channel TLV Parameters (Continued)

Preamble Pattern	3	1-128	The Value field defines the first portion of the Preamble Superstring. If there is no Extended Preamble Pattern parameter, then this parameter defines the entire Preamble Superstring. All burst-specific preamble values are chosen as bit-substrings of the Preamble Superstring. The first byte of the Value field contains the first 8 bits of the superstring, with the first bit of the preamble superstring in the MSB position of the first Value field byte, the eighth bit of the preamble superstring in the LSB position of the first Value field byte; the second byte in the Value field contains the second eight bits of the superstring, with the ninth bit of the superstring in the MSB of the second byte and sixteenth bit of the preamble superstring in the LSB of the second byte, and so forth.
Burst Descriptor (DOCSIS 1.x)	4	n	May appear more than once; described below.
Burst Descriptor (DOCSIS 2.0)	5	n	May appear more than once; described below.

Id. at 138. According to DOCSIS 2.0, burst descriptors are composed of "TLV encodings that define, for each type of upstream usage interval, the physical-layer characteristics that are to be used during that interval." *Id.*

123. In my opinion, the parameters specified by the UCD (e.g., the modulation rate, upstream frequency, preamble pattern, burst descriptor, and Ranging Required parameter) are parameters that specify the "form" of a RNG-REQ message transmitted by a CM. These parameters specify the form of the RNG-REQ in a way that is consistent with how the '690 describes how form is specified by parameters in a probe request. For example, the '690 Patent discloses, with reference to FIG. 4, "the probe transmitter or transmitters receive the probe request or requests. In one embodiment, the probe request specifies a plurality of parameters for the probe that will dictate the form of the probe to be transmitted. These parameters are discussed in more detail below with respect to FIG. 5." '690 Patent, 6:33-38. FIG. 5, reproduced below, "illustrates examples of parameters that may be modified or determined for generating a probe request according to an embodiment of the disclosed method and apparatus." *Id.*, 7:29-32.

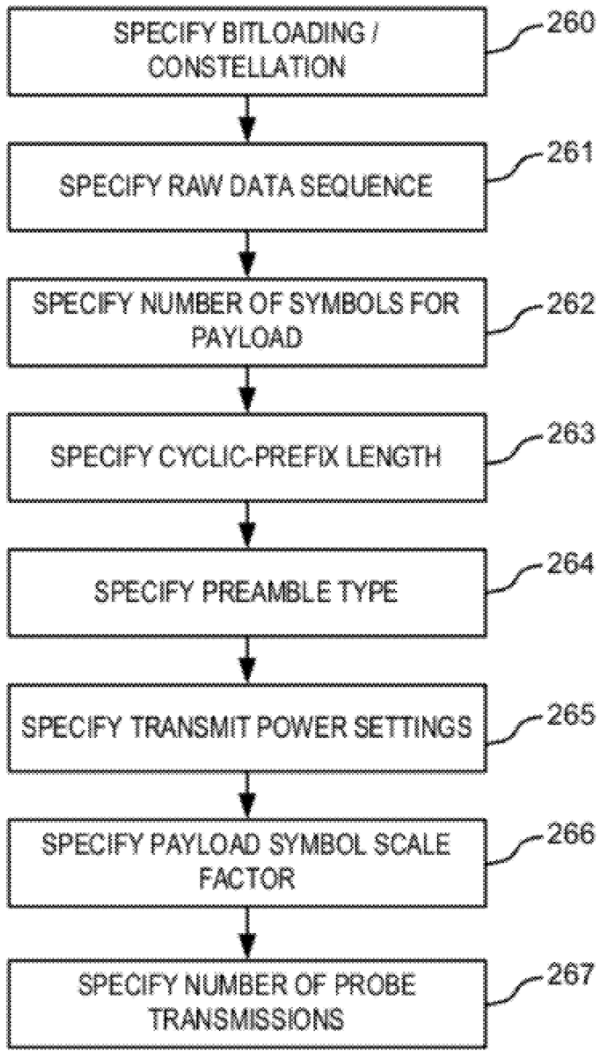

Fig. 5

124. In my view, DOCSIS 2.0 UCD and the '690 Patent probe request include similar parameters, which the '690 Patent describes as form parameters. For example, the UCD includes a parameter that instructs the modem to maintain its power level (DOCSIS 2.0 at 139), a preamble type (*id.* at 142), as well as a modulation rate. *Id.* at 137;'690 Patent, 2:10-11 (probe request

parameters include "modulation profile for the probe"). Thus, the UCD in DOCSIS 2.0 is a probe request consistent with the Court's construction of that term.

125. For the same reasons, it is my opinion that the above mentioned parameters are also "associated with the generation and transmission of a probe."

126. In addition, it is my opinion that the RNG-REQ requested by the UCD, and transmitted by a CM, is a "probe" within the meaning of the '690 Patent, and consistent with the Court's construction of that term.

127. I understand that the Court's construction of probe is "a signal transmitted to a network node that the network node can compare to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted." CC Order at 42. In my opinion, the RNG-REQ transmitted by a CM meets this definition.

128. As DOCSIS 2.0 discloses, and as a POSITA would have understood, transmissions downstream from a CMTS to a CM, and upstream from a CM to a CMTS are characterized, by DOCSIS 2.0, as "signals." For example, in describing transmission power levels on a DOCSIS 2.0 network, DOCSIS 2.0 states that:

> The nominal power level of the ***downstream CMTS signal(s)*** within a 6-MHz channel is targeted to be in the range -10 dBc to -6 dBc relative to analog video carrier level and will normally not exceed analog video carrier level. The nominal power level of the ***upstream CM signal(s)*** will be as low as possible to achieve the required margin above noise and interference.

Id. at 26. *See also id.* at 39 ("This specification defines the electrical characteristics and ***signal processing*** operations for a cable modem (CM) and cable modem termination system (CMTS)."). The "upstream signal-processing sequence" for DOCSIS 2.0 CM's is depicted in Figure 6-1:

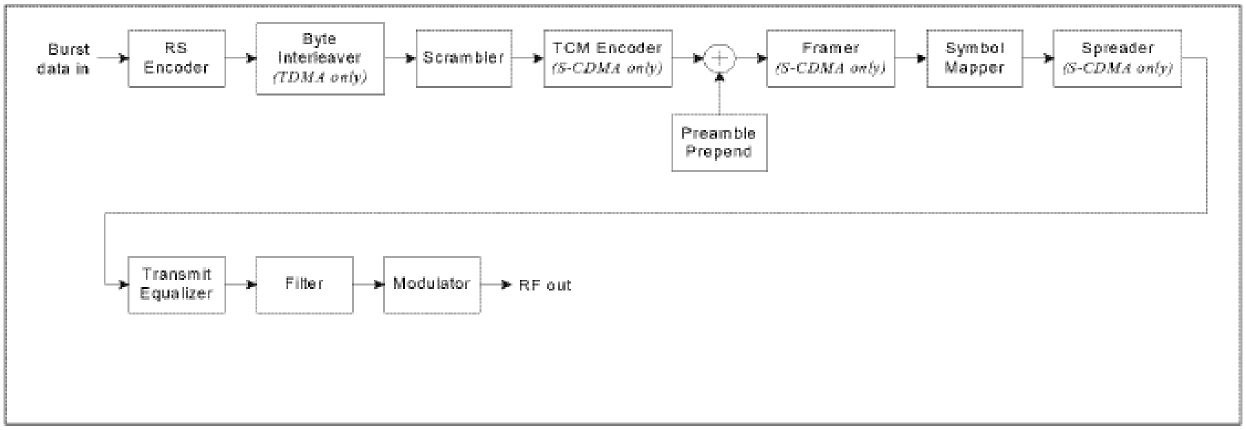

Figure 6-1 Upstream signal-processing sequence

129. In my opinion, a POSITA would have understood a RNG-REQ message to be a signal. A RNG-REQ message is "transmitted to a network node." For example, DOCSIS 2.0 discloses that a CMTS (a network node) receives the RNG-REQ from a CM:

> A Ranging Response MUST be transmitted by a ***CMTS in response to received RNG-REQ*** or INIT-RNG-REQ. The state machines describing the ranging procedure appear in Section 11.2.4. In that procedure it may be noted that, from the point of view of the CM, reception of a Ranging Response is stateless. In particular, the CM MUST be prepared to receive a Ranging Response at any time, not just following a Ranging Request.

Id. at 148.

130. In my opinion, a RNG-REQ message can be "compar[ed] to a reference signal having a known form in order to determine characteristics of the channel on which the signal was transmitted." CC Order at 42. For example, in response to receiving a RNG-REQ message, the CMTS generates and transmits to the CM a "Ranging Response" (RNG-RSP), which includes, among other things, a "Ranging Status" this is "used to indicate whether upstream messages are received within acceptable limits by [the] CMTS." *Id*. at 149. The RNG-RSP message also includes "Frequency Adjust Information," which "[s]pecifies the relative change in transmission frequency that the CM is to make in order to better match the CMTS." *Id*. The RNG-RSP, additionally, includes "Power Adjust Information," which "Specifies the relative change in

transmission power level that the CM is to make in order that transmissions arrive at the CMTS at the desired power." *Id.* Thus, in my opinion, the CMTS uses the RNG-REQ as a base for comparison against acceptable signal parameters, such as frequency and power, in order to subsequently instruct the CM to make appropriate adjustments.

131. My opinion is further informed by the fact that nothing in the Court's construction requires the CMTS, or any other network node, to actually perform the comparison. That is, in my opinion, the RNG-REQ sent by the CM can be compared (i.e., is ***capable*** of being compared) with a reference signal in order to assess channel characteristics. A DOCSIS 2.0 discloses that a RNG-REQ message has a format that is specified by the UCD sent by the CMTS (for example, a preamble pattern) that the CMTS would be capable of comparing to a reference in order to determine characteristics of the channel on which the RNG-REQ message was sent.

132. Summarizing, it is my opinion that the UCD sent from the CMTS to the CM is a probe request consistent with the Court's construction of that term and the RNG-REQ sent by the CM in response to the UCD comprises a probe consistent with Court's construction of that term.

133. In addition, as required by this claim limitation, the UCD (i.e., the claimed probe request) has a first plurality of parameters that at least "specify a content payload of the probe and a second node."

134. Regarding the content payload feature, in my opinion, DOCSIS 2.0 discloses it. According to DOCSIS 2.0, UCD and RNG-REQ messages are what the DOCSIS standard describes as "MAC management messages." *See id.* at 134 (Table 8-17).

135. Figure 8-14 of DOCSIS 2.0, reproduced below, depicts the general format of a MAC management message:

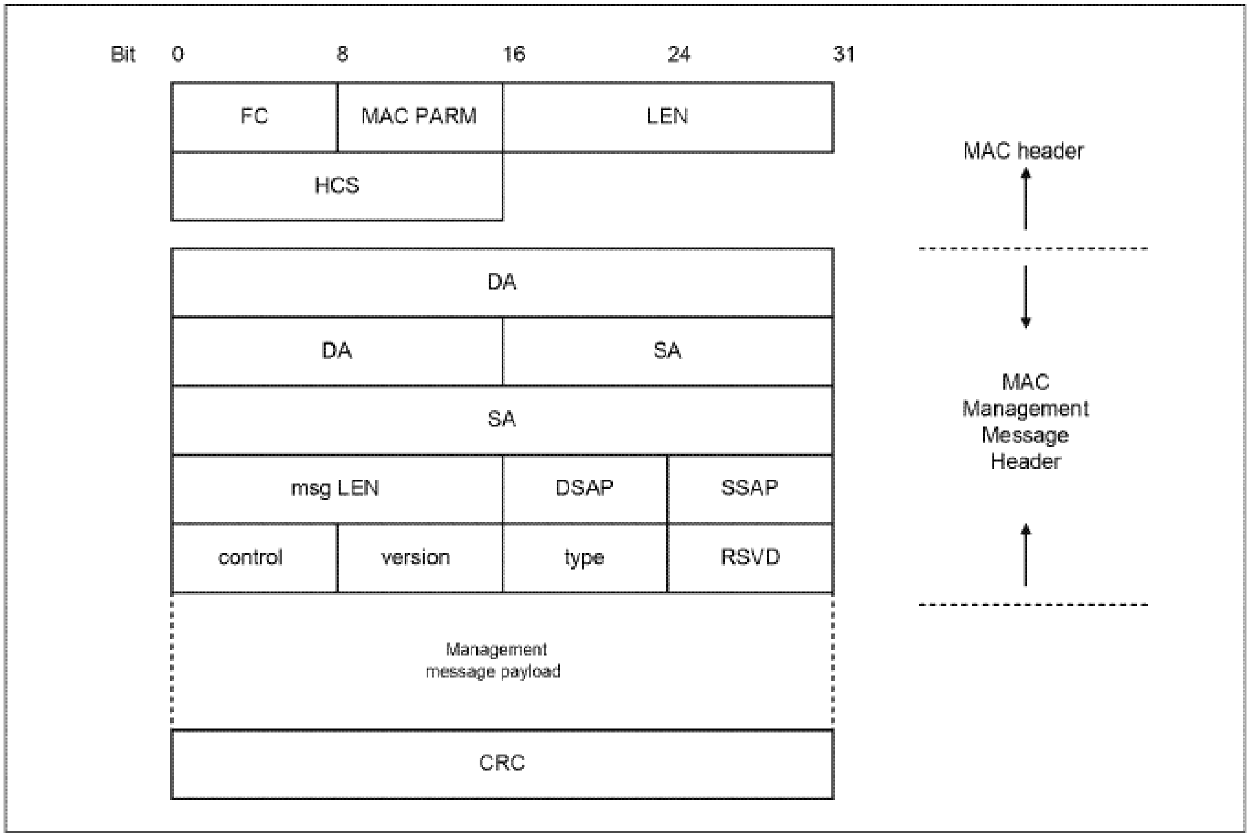

Figure 8-14 MAC Header and MAC Management Message Header Fields

Id. at 133.

136. As shown, each MAC management message has a MAC header, a MAC management message header, and a management message payload. Thus, a RNG-REQ message, as a MAC management message, also adheres to this general structure, as shown below:

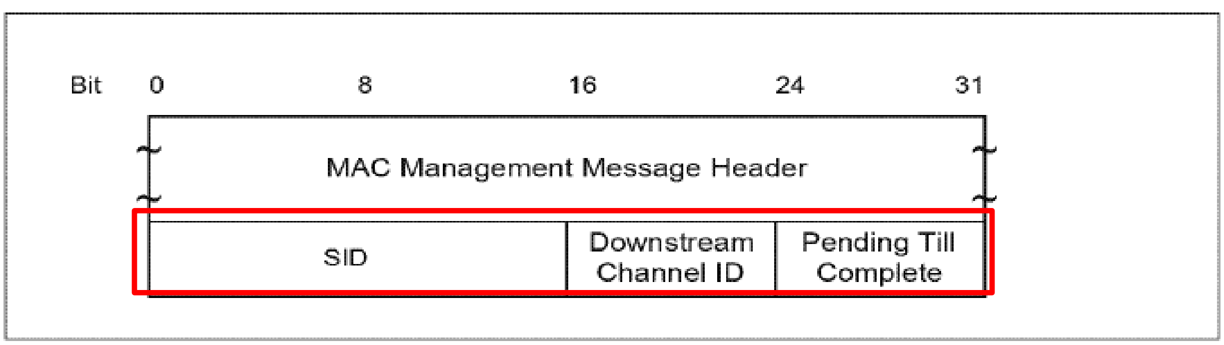

Figure 8-21 Packet PDU Following the Timing Header

Id. at 147. In the figure, I have highlighted the payload of the RNG-REQ (i.e., the payload of the probe, in the language of the '690 Patent), which is separate from the MAC management message header.

137. In my opinion, this payload is specified by the plurality of parameters in the UCD (the probe request). For example, as I discussed earlier, the UCD parameters include a "Ranging Required" parameter, which, when the UCD having that parameter set by the CMTS is received by the CM, the CM is required to begin a ranging process. The UCD includes, as one of its parameters, a "Downstream channel ID, " highlighted below:

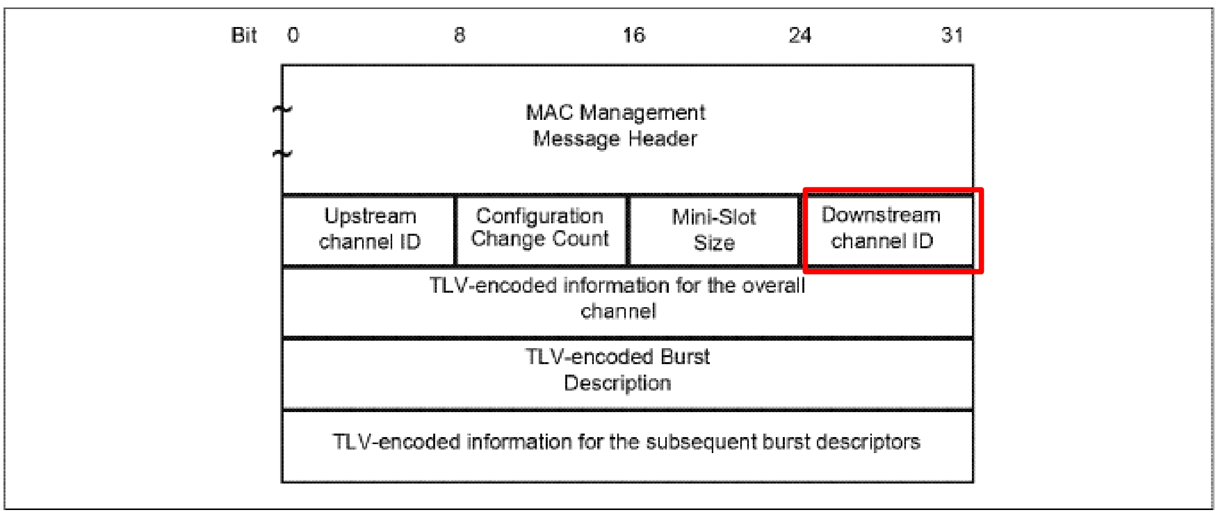

Figure 8-16 Upstream Channel Descriptor

Id. at 136. According to DOCSIS 2.0, the Downstream Channel ID is "[t]he identifier of the downstream channel on which this message has been transmitted." *Id.* at 137.

138. When the UCD message is received, the CM generates and transmits a RNG-REQ message with the following format:

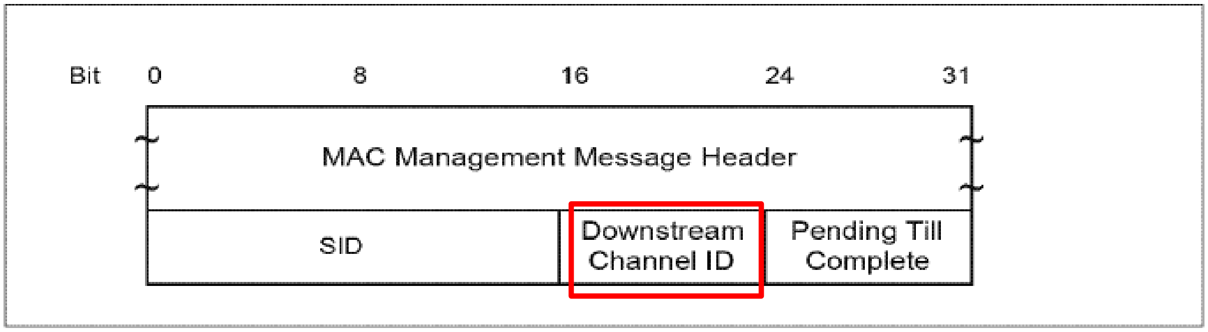

Figure 8-21 Packet PDU Following the Timing Header

Id. at 147. According to DOCSIS 2.0, the Downstream Channel ID (highlighted above) is "[t]he identifier of the downstream channel on which the CM received the UCD which described this upstream." *Id.*

139. In my opinion, the downstream channel ID is part of the "content payload" of the RNG-REQ message (i.e., the probe) because this value appears in the management message payload of the RNG-REQ message. In my view, the UCD "specifies" this content payload because, as discussed above, the UCD includes, as part of its own parameters, the downstream channel ID over which the UCD is sent by the CMTS.

140. I have reviewed Entropic's infringement contentions, which maintain that "[t]he P-MAP further specified a source address, which identifies a second node." Entropic's Second Suppl. Infringement Contentions, Ex. B, at 4-6. The "source address" that Entropic maintains is the recited "second node" is the source address that appears in the MAC management message header of the MAC management message that Entropic is accusing (in Entropic's case, a P-MAP message in DOCSIS 3.1). I note, however, that the UCD message in DOCSIS 2.0 is also a MAC management message and, as such, has a source address.

141. As shown in Figure 8-14, the MAC Management Message Header includes a "Destination Address (DA)" and a "Source Address (SA)." *Id.* at 133. According to DOCSIS 2.0,

the Destination Address (DA) is described as "a specific CM unicast address" or "the DOCSIS management multicast address." *Id.* The Source Address (SA) is described as "[t]he MAC address of the source CM or CMTS system." *Id.* Thus, in the context of the UCD message, the DA in the MAC Management Message Header would be either the CM's unicast address or the DOCSIS management multicast address, while the SA would be the address of the CMTS that transmitted the UCD.

142. Therefore, the in either case, the UCD specifies a "second node" (which, in this case, is the CMTS that transmits the UCD). In my opinion, a POSITA would have understood that the SA is a "parameter" within the plain meaning of the '690 Patent. I note that the '690 Patent does not define what a "parameter" is, nor where a "parameter" is required to appear within a probe request. Thus, under the plain meaning of "parameter" within the context of the '690 Patent, DOCSIS 2.0 discloses that its "first plurality of parameters" specify "a second node."

143. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation.

3. [1b]: "b) determining a second plurality of parameters associated with generation and transmission of the probe;"

144. In my opinion, DOCSIS 2.0 discloses or suggests this limitation.

145. As I noted in Section X.c, the specification of the '690 Patent does not disclose a "second plurality of parameters associated with generation and transmission of the probe."

146. Further, it is my understanding that Entropic interprets this limitation as being met when a cable modem "determines … particular symbols used in the probe, the specific subcarriers over which the probe is transmitted, and/or the power level used for transmitting the probe." Entropic's Second Suppl. Infringement Contentions, Ex. B, at 7. I also understand that during the Claim Construction hearing, Entropic argued that the second plurality of parameters could be "some non-form parameters, such as transmission power, timing, or destination." CC Order at 47.

147. As I explain below, my view is that there is no written description or enabling disclosure for this limitation in the '690 Patent. However, for the sake of argument, I have applied Entropic's apparent interpretation of what this limitation requires and, in my opinion, DOCSIS 2.0 discloses it.

148. For example, DOCSIS 2.0 discloses that, once a CM receives a UCD message with a Range Required parameter set to either 1 or 2, the CM begins a ranging process. *Id.* at 139. In my opinion, a POSITA would have understood that a CM that receives a UCD with the Range Required parameter set generates a RNG-REQ message.

149. It is my opinion that, when the CM generates a RNG-REQ message, the CM determines "a second plurality of parameters" associated with the generation and transmission of the RNG-REQ. For example, DOCSIS 2.0 discloses that the CM determines a "SID" ("Service Identifier"), which, according to DOCSIS 2.0, is "assigned by the CMTS … to an Active Upstream Service Flow." *Id.* at 20. For RNG-REQ messages that are transmitted in "Broadcast Initial Maintenance intervals," the CM transmits a "Primary SID (previously assigned in a REG-RSP message)." *Id.* at 147.

150. In addition, DOCSIS 2.0 discloses that the CM determines a "Pending Till Complete" parameter, which "If zero, then all previous Ranging Response attributes have been applied prior to transmitting [sic] this request. If non-zero then this is time estimated to be needed to complete assimilation of ranging parameters." *Id.* In some cases, when the CM generates a RNG-REQ message, the CM reports a "current transmit power shortfall," which "is the difference between the current target transmit power of the ranging request and the maximum SCDMA spreader-on transmit power of 53 dBmV." *Id.* at 148.

151. In my opinion, a POSITA would understand that each of the above parameters (i.e., the SID, Pending Till Complete, and transmit power shortfall) are parameters determined by the CM, and which are associated with the generation and transmission of the RNG-REQ.[8]

152. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation.

4. [1c]: "c) generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters; and"

153. In my opinion, DOCSIS 2.0 discloses or suggests this limitation.

154. I understand that the parties disagree on whether this term is indefinite. CC Order at 45. I also understand that the Court construed this term as having its "plain meaning." *Id.* at 47. I have reviewed Entropic's infringement contentions for this limitation and find that Entropic fails to indicate how the "Spectrum Accused Services" generate a probe in accordance with both the first plurality of parameters and the second plurality of parameter. *See* Entropic's Second Suppl. Infringement Contentions, Ex. B, at 7 ("as described above, the first plurality parameters specified in the P-MAP define at least the form for the probe. The cable modem generates the probe in accordance with the first and second plurality of parameters.")

155. Nonetheless, to the extent that this limitation can be understood by a POSITA, DOCSIS 2.0 discloses it. For example, a POSITA would have understood that DOCSIS 2.0 discloses that the RNG-REQ (i.e., the probe) is generated "in accordance" with the parameters specified in the UCD (i.e., the first plurality of parameters specified in the probe request) and "in

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[8] I understand that the parties agreed that the term "associated with the generation and transmission of the probe" should be afforded its plain and ordinary meaning. CC Order at 7. Accordingly, I have interpreted this term under its plain meaning as would be understood by a POSITA.

accordance" with the second plurality of parameter determined by the CM, as I discussed in Section X.g.i.3.

156. As I discussed in Section X.g.i.2, the UCD generated and transmitted by the CMTS specifies parameters, such as modulation rate, upstream frequency, preamble pattern, and burst descriptor. *Id.* at 137-38. The CM determines a Primary SID, a Pending Till Complete parameter, and, in some cases, a transmit power shortfall when it generates the RNG-REQ in response to receiving a UCD from the CMTS. In my opinion, under the plain meaning of the phrase "in accordance with" (i.e., in a way that agrees with or follows), the CM generates the RNG-REQ in accordance with the parameters specified in the received UCD and in accordance with the parameters that the CM, itself, determines.

157. As I also discussed in Section X.g.i.2, the parameters that are included in the UCD transmitted by the CMTS specify the form of the RNG-REQ that the CM generates. For essentially the same reasons, it is my opinion that these parameters "dictate" the form of the RNG-REQ.

158. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation.

5. [1d]: "d) transmitting the probe from the first node to the second node."

159. In my opinion, DOCSIS 2.0 discloses or suggests this limitation.

160. For example, DOCSIS 2.0 discloses that the CM (i.e., the recited first node) transmits the RNG-REQ (i.e., the probe) to the CMTS (i.e., the recited second node). Specifically, DOCSIS 2.0 discloses that "[a] Ranging Request MUST be transmitted by a CM at initialization on an upstream other than a DOCSIS 2.0 Only Upstream, and periodically on request from CMTS to determine network delay and request power adjustment." *Id.* at 146. "[O]n a DOCSIS 2.0 Only Upstream the CM transmits an INIT-RNG-REQ … message at initialization instead but uses the

RNG-REQ for all unicast maintenance opportunities provided by the CMTS." *Id.* Thus, as shown DOCSIS 2.0 discloses that RNG-REQ messages are transmitted upstream by the CM.

161. DOCSIS 2.0 also discloses, with respect to a "Ranging Response" that is transmitted by a CMTS, "[a] Ranging Response MUST be transmitted by a CMTS in response to ***received RNG-REQ*** or INIT-RNG-REQ." *Id.* at 148. Therefore, in my view, a POSITA would have understood DOCSIS 2.0 as disclosing that the CM transmits the RNG-REQ message to the CMTS.

162. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation.

6. [7]: "The method of claim 1, wherein the probe request requests a probe that assists in diagnosing a network problem. "

163. In my opinion, DOCSIS 2.0 discloses or suggests this claim.

164. The '690 Patent discloses that, prior to the patent's alleged invention, the increase in network complexity gave rise to an increased need to diagnose sources of network problems. '690 Patent, 1:30-36. In describing "related art," the patent discloses that:

> In many instances in which a network is established, it is helpful to characterize the communication channel over which data is to be sent between nodes of the network. It should be noted that for the purposes of this disclosure, a "channel" is the communication link between a first node of a network and a second node of a network in one particular direction. Therefore, there is a first channel from a first node 1 to a second node 2 and a second unique channel from the second node 2 to the first node 1. In some instances, probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node. These probes are typically well defined. Accordingly, the receiving node knows before reception what reference signal was transmitted. By comparing the reference probe with the actual received probe, the receiver can determine some of the characteristics of the channel between the transmitting and receiving node.

Id., 1:41-57.

165. Therefore, as the ’690 Patent discloses, the use of probes to assist in diagnosing network problems was already well known in the art before the alleged priority date of the ’690 Patent. In my opinion, the RNG-REQ that the CM transmits in response to a UCD sent by the CMTS is an example of a “probe that assists in diagnosing a network problem,” as required by claim 7.

166. For example, DOCSIS 2.0 discloses that a CMTS, upon receiving a RNG-REQ message from a CM, generates and transmits a “Ranging Response” or (RNG-RSP). DOCSIS 2.0 at 148. Among the parameters that the RNG-RSP incudes are: Ranging Status, which provides an indication “whether upstream messages are received within acceptable limits by CMTS; Power Adjust Information, which “[s]pecifies the relative change in transmission power level that the CM is to make in order that transmissions arrive at the CMTS at the desired power”; and Frequency Adjust Information, which “[s]pecifies the relative change in transmission frequency that the CM is to make in order to better match the CMTS.” *Id.* at 149. In my opinion, these parameters, which are sent in response to a RNG-REQ message sent by the CM, indicate that the RNG-REQ message is used by the CMTS to diagnose problems on the network, such as, for example, the need for a CM to transmit at a higher power level or at a different frequency in order to improve communication with the CMTS.

167. Accordingly, in my opinion, DOCSIS 2.0 teaches or suggests this claim.

7. [8]: “The method of claim 7, wherein the probe request is generated by a network operator and uploaded to the second node.”

168. In my opinion, DOCSIS 2.0 teaches or suggests this this claim.

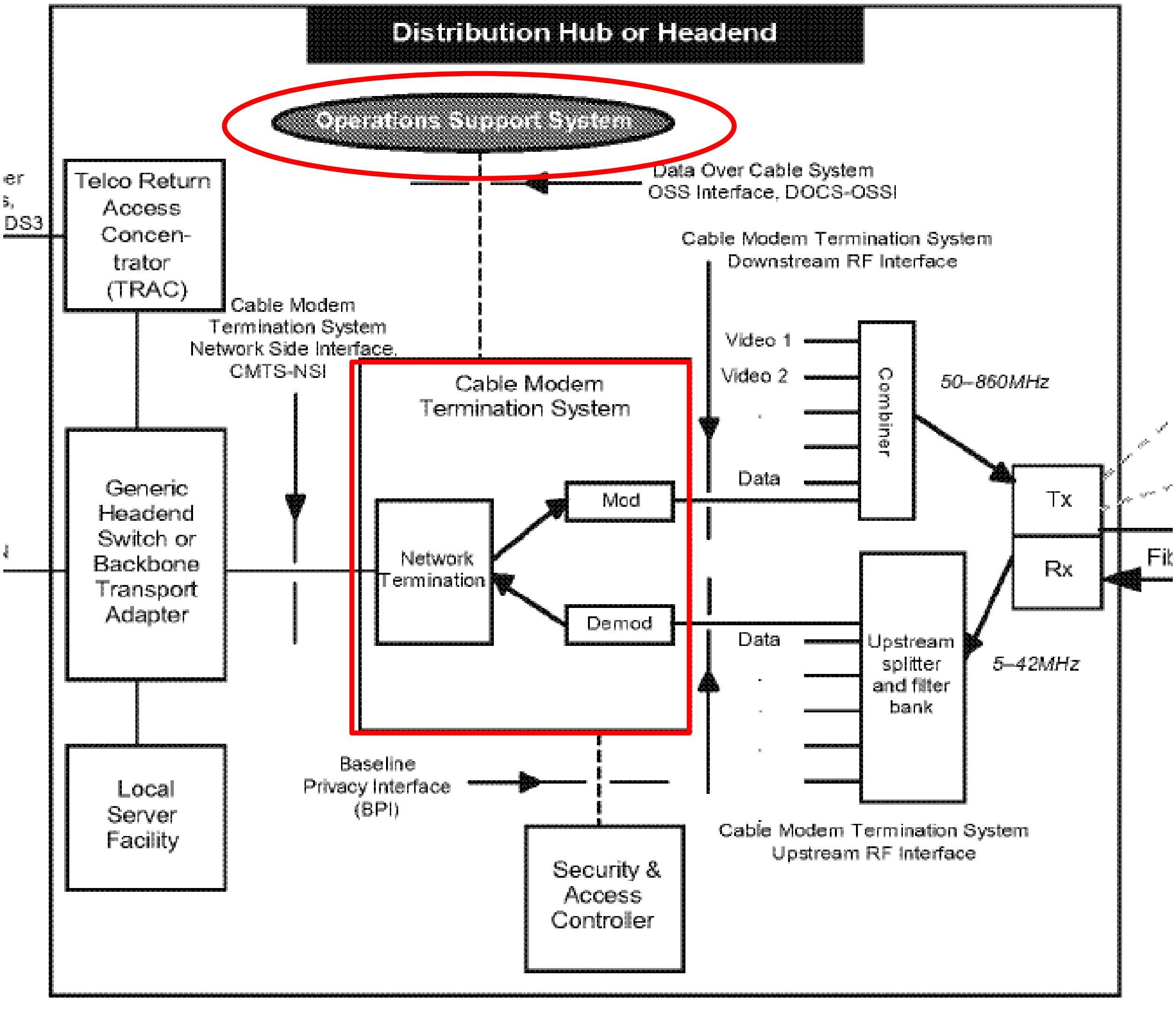
169. As I discussed in Section X.g.i.6, DOCSIS 2.0 teaches or suggests claim 7.

170. In my opinion, DOCSIS 2.0 suggests or, at the very least, renders obvious the additional limitation of "wherein the probe request is generated by a network operator and uploaded to the second node." For example, DOCSIS 2.0 discloses that UCD parameters can be changed. *See id.* at 263 ("Changing Upstream Channel Descriptor Message Parameters"). Specifically, DOCSIS 2.0 discloses that:

> Whenever the CMTS is to change any of the upstream burst characteristics specified in the Upstream Channel Descriptor (UCD) message (see Section 8.3.3), it must provide for an orderly transition from the old values to the new values by all CMs. Whenever the CMTS is to change any of the upstream characteristics, it MUST announce the new values in an UCD message, and the Configuration Change Count field in that UCD message MUST be incremented to indicate that a value has changed.

Id.

171. DOCSIS 2.0 also discloses a "Reference Architecture" that includes a "Distribution Hub or Headend" which, itself, includes a CMTS. I depict and annotate below an excerpt of Figure 1-2:



Id. at 4 (annotated). Highlighted in the figure is an "Operations Support System" which, as shown, is in communication with the CMTS, which I have also highlighted. Relatedly, DOCSIS 2.0 discloses "Operations Support Systems Interfaces," which "are network element management layer interfaces between the network elements and the high-level OSSs (operations support systems) which support the basic business processes." *Id.*

172. The term "OSS" is a term of art and would be understood by a POSITA. An OSS can be described as a system that "enables telecommunications organizations to analyze and control all network connections and components, including computers, servers, and routers."

Technical employees, including network administrators or network operators, manage the telecom network and oversee the OSS. *See, e.g.*, Newton's Telecom Dictionary, 26th Expanded and Updated Edition (2011) (CHARTER_ENTROPIC00389586 – 00389588) ("Newton") at 847 ("**OSS**. Operations Support System. Methods and procedures … which directly support the daily operation of the telecommunications infrastructure."). *See also id.* ("***Operations Support System Interface***. An element of DOCSIS … the OSSI provides the interface between the cable modem and the OSSs. ***The OSSs … provide*** for the management of faults, performance, ***configuration***, security, and accounting.").

173. In my opinion, the above figure and accompanying disclosure suggests, or at least renders obvious to a POSITA, that an operations support system (OSS), managed by a network operator or administrator, would communicate with the CMTS to configure UCD parameters, such as the upstream burst characteristics described above. DOCSIS 2.0 discloses that, during normal operation, the CMTS can be directed, via Simple Network Management Protocol (SNMP) or otherwise, to perform realtime modem configuration, such as moving modems to different channels. *Id.* at 326. In my opinion, a POSITA would have found it obvious to adapt the DOCSIS 2.0 CMTS, to the extent necessary, to configure UCD parameters.

174. I note that the '690 Patent does not define what it means to "upload" a probe request. I understand that Entropic interprets this claim requirement to be met if an operator requests a CMTS to generate and send a probe request to a CM. *See* Entropic's Second Suppl. Infringement Contentions, Ex. B at 8 (describing infringement theory for claim 8). As I have discussed above, since DOCSIS 2.0 suggests a similar interaction (i.e., an "operator" commanding a CMTS to update a UCD or probe request message parameters, DOCSIS 2.0, in my opinion discloses or render obvious claim 8.

8. [9pre]: "A method comprising:"

175. As I discussed in Section X.g.i.1, DOCSIS 2.0 discloses this limitation.

9. [9a]: "a) a first node transmitting a probe request to a second node, the probe request specifying a first plurality of probe parameters for a physical layer probe, the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe;"

176. In my opinion, DOCSIS 2.0 discloses or suggests this limitation.

177. I understand claim 9 as being written from the perspective of the transmitter of the probe request (i.e., the probe receiver), in contrast to claim 1, which is written from the perspective of the transmitter of the probe (i.e., the receiver of the probe request). Hence, with respect to the UCD/RNG-REQ message interaction between the CMTS and CM that I discussed in Section X.g.i, the "first node" recited in claim 9 is the CMTS, while the "second node" is the CM.

178. As I discussed in Section X.g.i.2, the UCD disclosed in DOCSIS 2.0 is a "probe request" within the meaning of the '690 patent, and consistent with the Court's construction of this term.

179. It is my opinion that a POSITA would have understood that the UCD specifies "a first plurality of probe parameters for a physical layer probe." As discussed in Section X.g.i.2, the DOCSIS 2.0 UCD specifies parameters, such as modulation rate, frequency, preamble pattern, and burst descriptor. As I discussed in that section with respect to claim 1, these parameters are "associated with the generation and transmission of a probe." I understand that the Court has construed "physical layer probe" in accordance with its plain meaning, in view of the Court's construction of "probe." In my opinion, the RNG-REQ message sent by the CM meets the Court's construction of "probe." In my opinion, the RNG-REQ message sent by the CM is a "physical layer" signal, as a POSITA would have understood that term. Indeed, DOCSIS 2.0 itself defines

"Physical (PHY) Layer" as "Layer 1 in the Open System Interconnection (OSI) architecture; the layer that provides services to transmit bits or groups of bits over a transmission link between open systems and which entails electrical, mechanical and handshaking procedures." *Id.* at 18. As such, in my opinion, a POSITA would have understood that a RNG-REQ message comprises bits or groups of bits transmitted over a transmission link between two systems (i.e., the CM and CMTS).

180. In my opinion, the plurality of parameters specified in the UCD "[comprise] a form for the probe including a modulation profile for the probe." As I discussed in Section X.g.i.2, the '690 patent provides a list of parameters that, according to the patent, "may be modified or determined for generating a probe request." '690 Patent, 3:8-11. FIG. 5, which I again reproduce below, illustrates these parameters:

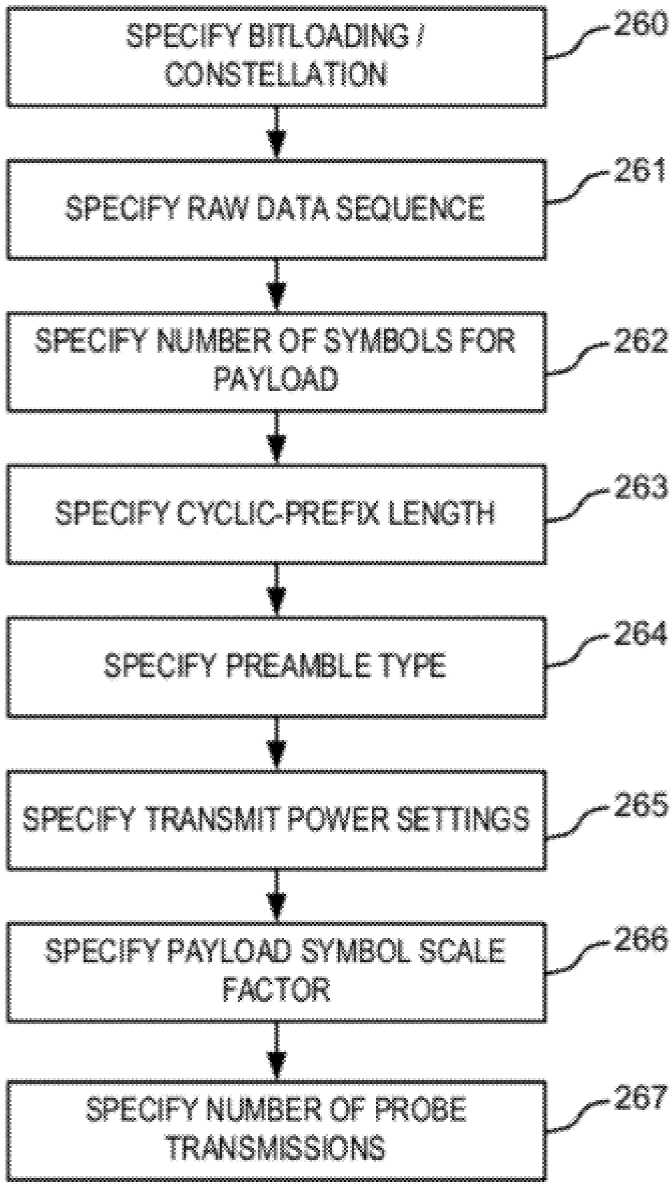


Fig. 5

Id. at FIG. 5.

181. As discussed above, a POSITA would have understood that these parameters comprise a "form" for a probe. *See, e.g., id.*, 6:34-38 ("In one embodiment, the probe request

specifies ***a plurality of parameters for the probe that will dictate the form of the probe*** to be - transmitted. These ***parameters are discussed in more detail below with respect to FIG. 5***.") (emphasis mine). As shown in FIG. 5, among these parameters are a bitloading profile or constellation profile, *id.*, 7:32-33, a preamble type, *id.*, 8:20-21, and a transmit power setting, *id.*, 8:59-60. According to the '690 Patent, one "type of preamble may comprise a specified subset of subcarrier frequencies." *Id.*, 3:54-55.

182. Similar to the types of "form"-related parameters described in the '690 Patent, the DOCSIS 2.0 UCD Channel TLV parameters also specify a frequency (corresponding to the upstream center frequency at which the CM transmits), and a power spectral density parameter (which instructs the CM on whether to maintain to change its transmit power level). DOCSIS 2.0 at 137-139. Thus, it is my opinion that at least the UCD Channel TLV Parameters comprise a "form" for the upstream signal.

183. As claim 9 requires, the Channel TLV Parameters also include "a modulation profile for the probe." In the '690 Patent, the term "modulation profile" is not defined. The patent, however, discloses that, in an OFDM network, an "OFDM symbol is formed from the collection of all of the QAM symbols modulated onto each of the used subcarriers in the same time slot." '690 Patent, 4:47-50. For example, "an OFDM symbol may comprise a plurality of subcarriers each modulated with 4-QAM." *Id.*, 4:51-53. Further, "[i]n another embodiment, transmissions on different subcarriers may utilize different QAM schemes. For example, a first subcarrier may be modulated using 2-QAM (otherwise known as binary phase shift keying (BPSK)), a second subcarrier may be modulated using 64-QAM, and so on." *Id.*, 4:53-58. In my view, these different QAM schemes (i.e., 2-QAM, 4-QAM, and 64-QAM) are. "modulation profiles" within the meaning of the '690 Patent.

184. In DOCSIS 2.0, the upstream communication from the CM to the CMTS is not OFDMA (i.e., orthogonal frequency division multiple access). It uses TDMA (Time Division Multiple Access) or S-CDMA, which stands for "synchronous code division multiple access." DOCSIS 2.0 at 42-43. As taught by DOCSIS 2.0, TDMA "indicates that upstream transmissions have a burst nature," while S-CDMA "indicates that multiple CMs can transmit simultaneously on the same RF channel and during the same TDMA time slot, while being separated by different orthogonal codes." *Id.* at 39.

185. As Table 8-18 further shows, the Channel TLV Parameters include a "Modulation Rate," which is expressed as a multiple of a base rate, and can take on a value of 1, 2, 4, 8, 16, or 32. *Id.* at 185. In my opinion, as QAM-2, QAM-4, and QAM-64 correspond to "modulation profiles" in OFDM networks, the Modulation Rate specified in the Channel TLV Parameters corresponds to a "modulation profile" for transmitting a signal on a TDMA or S-CDMA channel. It is therefore my opinion that the parameters of the DOCSIS 2.0 UCD also includes "a modulation profile" for a probe.

186. Accordingly, in my opinion, this limitation is anticipated or rendered obvious by DOCSIS 2.0.

10. [9b]: "b) the first node receiving the probe from the second node, wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node."

187. In my opinion, DOCSIS 2.0 teaches or suggests this feature, or at least would have rendered this feature obvious.

188. As I discussed above in Section X.g.i.9, the recited "first node" in claim 9 corresponds to the CMTS. As discussed in that section and in Section X.g.i.2, the RNG-REQ

message transmitted by the CM in response to receiving the UCD is a "probe" within the meaning of the '690 Patent and is consistent with the Court's construction of the term "probe."

189. Further, as I discussed in Section X.g.i.5, the CMTS (the claimed first node) receives the RNG-REQ message (the claimed probe) from the CM (the claimed second node).

190. Lastly, as I discussed in Section X.g.i.4, the RNG-REQ message (the claimed probe) is generated in accordance with the parameters specified in the UCD (the claimed first plurality of parameters) and in accordance with the parameters determined by the CM when the CM generates the RNG-REQ message (which are the claimed second plurality of parameters).

191. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation.

11. [15]: "The method of claim 9, wherein the probe request is configured to diagnose a network problem."

192. In my opinion, DOCSIS 2.0 discloses or suggests this claim.

193. As I discussed above in Section X.g.i.6 with respect to claim 7, DOCSIS 2.0 discloses or would have rendered obvious "wherein the probe request requests a probe that assists in diagnosing a network problem." It is my opinion that, for the same reasons I set forth in that section, DOCSIS 2.0 discloses or renders obvious this claim.

12. [16]: "The method of claim 15, wherein the probe request is generated by a network operator and uploaded to the first node. "

194. In my opinion, DOCSIS 2.0 suggest this claim, or at least would have rendered the claim obvious for at least the same reasons that I discussed in Section X.g.i.7 with respect to claim 8.

ii. Claim 11 Is Invalid Over DOCSIS 2.0 and Ciciora

195. In my opinion, as discussed in further detail below, DOCSIS 2.0 in combination with Ciciora would have rendered obvious claim 11 of the '690 Patent.

1. [11pre]: "The method of claim 9, further comprising:"

196. As I discussed Sections X.g.i.8 and X.g.i.1, DOCSIS 2.0 discloses or suggests this limitation.

2. [11a]: "a) the first node transmitting a second probe request to a third node;"

197. In my opinion, the recited "first node" corresponds to the CMTS, while the recited third node corresponds to a CM that is different than the "second node," which, as I have discussed in Section X.g.i.9, is also a CM. DOCSIS 2.0 discloses that multiple CMs communicate with a single CMTS on the downstream channel. *See, e.g., id.* at 36:

> The MAC sublayer defines a single transmitter for each downstream channel - the CMTS. All CMs listen to all frames transmitted on the downstream channel upon which they are registered and accept those where the destinations match the CM itself or CPEs reached via the CMCI port. CMs can communicate with other CMs only through the CMTS.

198. Therefore, for this reason, and for the reasons I have discussed in Section X.g.i.9, DOCSIS 2.0 discloses or suggests a CMTS (first node) that transmits a UCD ("a second probe request") to a CM (a "third node").

3. [11b]: "b) and the first node receiving a second probe from the third node, wherein the second probe is generated according to the second probe request; and"

199. In my opinion, the recited "second probe" corresponds to a RNG-REQ message transmitted by the recited "third node" (which, as I have discussed in Section X.g.ii.2, is a CM. Specifically, for the reasons I discussed in Section X.g.i.10, DOCSIS 2.0 discloses or suggests a CMTS that receives a RNG-REQ message (i.e., the recited "second probe") transmitted by the CM ("the third node"), where the RNG-REQ message is generated according to the UCD received by the CM (i.e., the second probe request received by the third node).

200. Accordingly, in my opinion, DOCSIS 2.0 discloses or suggests this limitation for the same reasons discussed in Section X.g.i.10.

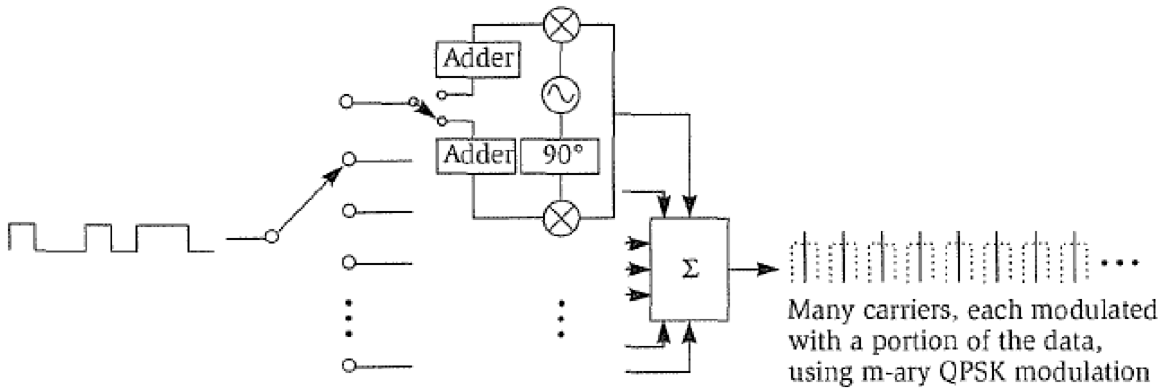
4. [11c]: "wherein the first probe and second probe are transmitted simultaneously using OFDMA."

201. Although DOCSIS 2.0 does not expressly disclose simultaneous communication of signals using OFDMA, in my opinion, this limitation would have been obvious to a POSITA before the alleged priority date of the '690 Patent.

202. "OFDMA," which stands for "Orthogonal Frequency Division Multiple Access," is a communication technique that was well known prior to the '690 Patent. For example, Ciciora, in describing various techniques for sharing the spectrum of a cable network, illustrates a technique known in the art as "OFDM" (or "Orthogonal Frequency Division Multiplexing"), which is the single user basis for multiuser OFDMA. Ciciora at 173.[9]

203. As Ciciora teaches, in OFDM transmission, "incoming data is broken into a number of individual datastreams, each of which is then modulated onto its own carrier. The carriers are spaced just far enough apart to prevent undue adjacent channel interference." *Id.* Ciciora illustrates the concept of OFDM in the figure below:

[9] For brevity, I cite to the page numbers of Ciciora instead of the Bates numbers affixed by Charter.



Id. (Figure 4.20).

204. As indicated in the figure, data is transmitted on the different carriers in a parallel manner (or simultaneously, as recited in claim 11).

205. Ciciora goes on to teach that OFDM transmission has certain advantages. For example, as Ciciora states:

> [By dividing the spectrum as shown, one replaces a single band of high-speed data with a large number of bands of lower-speed data. Since demodulation is done over a narrower band, the effects of impulse noise and group delay are reduced, and the effective carrier-to-noise ratio is improved in each channel by the narrowing of the passband.

Id.

206. Ciciora also confirms that, at the time that OFDM was known in the art, OFDMA transmission was also a technique known in the art. Ciciora discloses that, "[f]or return path services, it is possible to allow ***bits on different subchannels to originate from different transmitters***. In this case, the technique has been called orthogonal frequency division multiple access (OFDMA)." *Id.* OFDMA enables data from multiple sources/transmitters to modulate one or more subchannels.

207. It is my opinion that a POSITA would have been motivated to combine the teachings of DOCSIS 2.0 and Ciciora with a reasonable expectation of success. As the '690

Patent's description of the related art indicates, increasingly complex networks gave rise to an increase likelihood of network problems, which, the '690 Patent suggests, highlighted the importance of characterizing the communication channel over which data is sent between network nodes. *See, e.g.*, '690 Patent, 1:31-44. To this end, DOCSIS 2.0 describes a technique whereby a CMTS transmits a UCD to one or more CMs, which, in response, transmit a RNG-REQ message in accordance with the parameters that are specified in the UCD. The communication technique used in DOCSIS 2.0 for the UCD and for the responsive RNG-REQ message can be either "TDMA" or "S-CDMA," which stand for, respectively, "time division multiple access" and "synchronous code division multiple access." DOCSIS 2.0 at 39. Further, as Ciciora notes, S-CDMA is another upstream communication technique that allows for ***simultaneous*** signal transmission and reception. Ciciora at 174-75

208. Thus, in my opinion, it would have been obvious to a POSITA to apply an OFDMA-based network instead of a TDMA or S-CDMA network to DOCSIS 2.0. Doing so would have, at the very least, involved nothing more than applying a known technique (i.e., an OFDMA technique for sending a channel assessment probe request, such as a UCD in a DOCSIS 2.0 TDMA or S-CDMA-based network, and receiving, in response, a probe, such as a DOCSIS 2.0 RNG-REQ message) using a known device (i.e., a CMTS and/or CM) to yield predictable results (i.e., an OFDMA-based DOCSIS 2.0 network that enables a network operator to assess characteristics of OFDMA subchannels).

209. Accordingly, in my opinion, this limitation is rendered obvious by DOCSIS 2.0 in combination with Ciciora.

h. Subject Matter Eligibility

210. I have been asked to provide my opinions on the subject matter eligibility of the asserted claims of the '690 Patent. In my opinion, the claims are invalid because they are directed

to an abstract idea and do not recite an inventive concept. I provide my opinions below with respect to claim 1 as being representative of all of the claims being asserted by Entropic. Specifically, it is my opinion that each of claims 7-9, 11, 15, and 16 are directed to the same abstract idea as claim 1, and none of these claims adds an inventive concept that cures the deficiencies of claim 1.

211. In my view, the asserted claims of the ’690 patent are directed to unpatentable subject matter in that, in essence, they recite no more than the abstract idea of a node sending a probe in a form that is dictated by another node, such as the receiver of the probe.

212. The ’690 Patent acknowledges that the use of probes to determine channel characteristics was well known in the art. For example, the specification provides as background:

> In many instances in which a network is established, it is helpful to characterize the communication channel over which data is to be sent between nodes of the network. It should be noted that for the purposes of this disclosure, a “channel” is the communication link between a first node of a network and a second node of a network in one particular direction. Therefore, there is a first channel from a first node 1 to a second node 2 and a second unique channel from the second node 2 to the first node 1. ***In some instances, probes are sent between nodes of the network in order to allow a receiving node on the network to determine some of the characteristics of the channel between the receiving node and the transmitting node. These probes are typically well defined***. Accordingly, the receiving node knows before reception what reference signal was transmitted. By comparing the reference probe with the actual received probe, the receiver can determine some of the characteristics of the channel between the transmitting and receiving node.

’690 Patent, 1:41-57.

213. Rather than using probes having a predefined form, the alleged invention is to allow the receiver of the probe to determine what the form of the probe should be. Hence, the title of the patent, “Receiver Determined Probe.” This is analogous to having a cook make something special for you (an eater defined meal) rather than ordering off the menu (a predefined meal). There is no more to the invention as claimed than that.

214. Claim 1 recites generic and functional steps that involve nothing more than the well-known process of requesting and transmitting probes. For example, the claim, distilled down to its basic elements, simply requires receiving a probe request (e.g. from the receiver of the probe) that includes parameters identifying the form of the probe, determining some additional parameters; and generating and transmitting a probe having the form requested. Independent claim 9 is similar.

215. Thus, in my view, the claims are directed to nothing more than an abstract idea, as described above.

216. In addition to being directed to an abstract idea, the asserted claims of the '690 Patent fail to recite any components other than "nodes" that are capable of transmitting and receiving probe requests and probes. For example, claims 1 and 9 simply recite a "first node" and a "second node," without providing any details on what features these nodes have. In my opinion, this is insufficient to recite an "inventive concept."

217. The specification of the '690 Patent confirms that the claimed nodes are nothing more than generic, well known, computing devices. For example, the '690 Patent discloses that "FIG. 1 illustrates an example of one environment in which some embodiments of the disclosed method and apparatus may be implemented," which illustrates exemplary "nodes" labeled in the figure as 102, 103, 104, 105, and 106. *Id.*, 2:65-67.

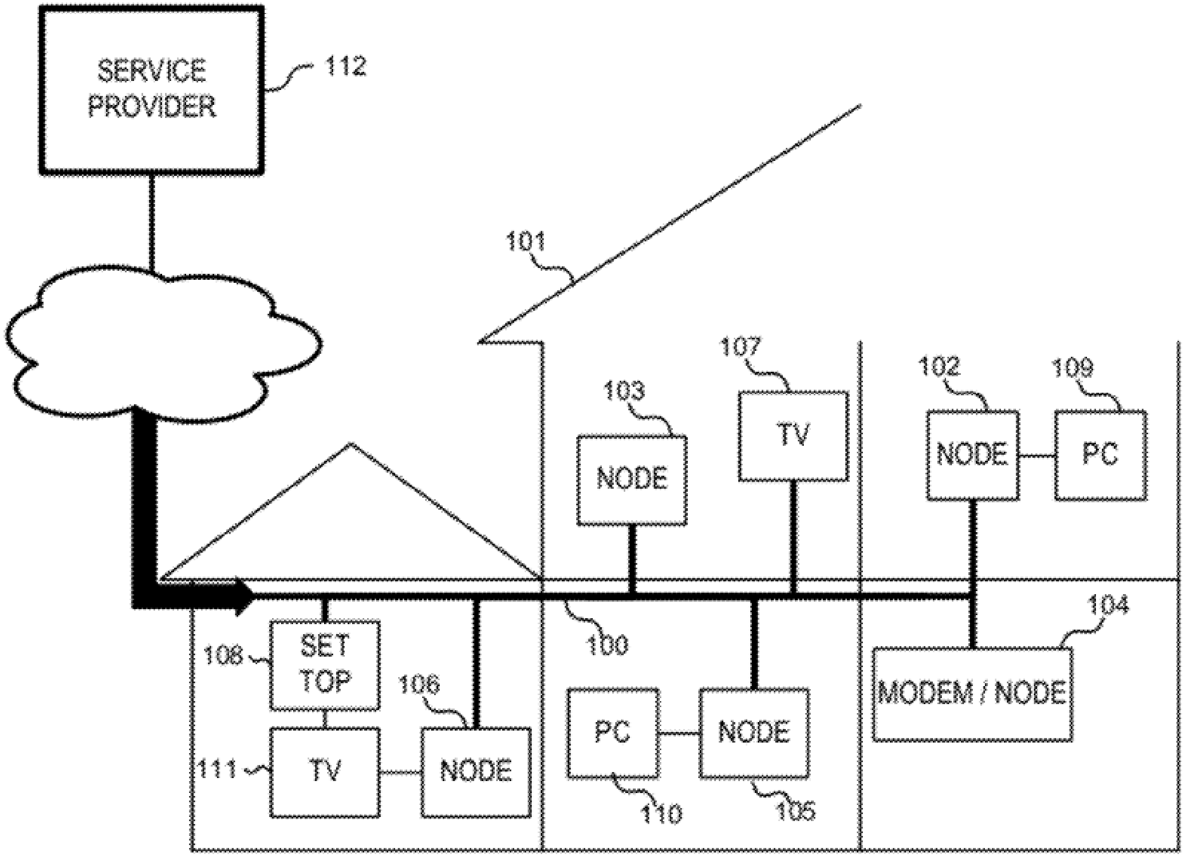


Fig. 1

218. As described by the patent:

Nodes described herein can be associated with a variety of devices. For example, in a system deployed in a residence 101, ***a node may be a network communications module associated with one of the computers 109 or 110.*** Such nodes allow the computers 109, 110 to communicate on the communications medium 100. Alternatively, ***a node may be a module associated with a television 111 to allow the television to receive and display media streamed from the internet,*** or from one or more other network nodes. A ***node might also be associated with a speaker or other media playing devices 103 that plays music***. A ***node might also be associated with a module configured to interface with an internet or cable service provider 112***, for example to provide Internet access, digital video recording capabilities, media streaming functions, or network management services to the residence 101.

Id., 4:10-24. As demonstrated by the patent, the nodes described and claimed are, in my opinion, well-known, conventional, and routine computing devices and components.

219. The dependent claims also fail to recite an inventive concept that would transform the abstract idea into patentable subject matter. For example, claims 7 and 15 simply specify that the claimed probe request and probe are used to diagnose a network problem. The diagnosing of network problems, as the ’690 Patent teaches, was well known in the art. *Id.*, 1:32-34 (“subscriber service content providers are typically required to diagnosis the source of the network problem.”). Claims 8 and 16 recite that the probe request is generated and uploaded by a network operator, which is not an inventive concept and, as described below, is not disclosed in the specification.

220. Claim 11 includes the use of simultaneous transmission using OFDMA. As I have discussed above, however, the use of OFDMA in networks to enable simultaneous transmission was well known, routine, and conventional in the art. *See, e.g.*, Ciciora at 173,

221. As a result, in my opinion, the asserted claims of the ’690 Patent do not recite anything more than an abstract idea implemented by conventional components and functions. To the extent Entropic provides additional information regarding the claims of the ’690 Patent at a later date, I reserve the right to amend my opinions in response.

i. Invalidity Under 35 U.S.C. § 112

i. “probe” (Claims 1 and 7)

222. In my opinion, claims 1 and 7 lack written description support and enablement because the term “probe” was not construed to be limited to physical layer probes. Claim 9 recites “a probe request specifying a first plurality of probe parameters for a ***physical layer probe***.” By contrast, claims 1 and 7 recite a method that comprises “a probe request specifying a first plurality of parameters associated with the generation and transmission of a ***probe***.” I understand that,

during claim construction, the Court rejected Charter's argument that "a 'probe,' even in claim 1, is necessarily a physical layer signal." CC Order at 40. I understand that the Court explained that "using a 'physical layer' probe is a specific feature of particular disclosed embodiments that should not be imported into the claims." *Id.* The Court continued: "To the extent Defendant maintains that a 'probe' must be a 'physical layer' probe because no other type of probe is disclosed in the specification, Defendant's argument perhaps may pertain to arguments regarding the enablement or written description requirements but does [not] warrant importing such a limitation into the claims." *Id.*

223. There is no support in the specification for a probe that would be something other than a physical layer probe. A POSITA would understand that a probe, in the context of the '690 patent, is necessarily a physical layer signal. First, the '690 Patent discloses only the transmission of physical layer packets. For example, the '690 Patent describes a transmitter module used within a node, whereby the transmitter generates "PHY" (or physical layer) packets:

> FIG. 3 illustrates a transmitter module 150 used within a node, such as the nodes 102, 103, 104, 105, 106 shown in FIG. 1. ***The transmitter module 150 generates <u>PHY</u> packets in accordance with one embodiment of the disclosed method and apparatus.*** The module 150 has a frequency domain payload 160 and/or a time domain payload 161. A subcarrier mapper 163 maps the payload 161 to a plurality of assigned subcarriers according to a predetermined bit loading profile for the channel (or sub-channel in the case of an OFDMA transmission). ***The transmitter module 150 uses a frequency domain preamble generator module 162 to insert a frequency domain <u>PHY</u> preamble before the frequency domain payload 160.*** Accordingly, a preamble specified in the frequency domain may be "prepended" to the payload after the subcarrier mapper 163. The combined signal is then modulated onto the OFDM symbol by a modulator module 164. The modulated signal is then filtered and upconverted to the channel's predetermined radio frequencies by the filter 165 and an RF upconverter 166.

'690 Patent, 5:57-6:8. *See also id.*, ("A PHY payload is used to transmit the data content of the packet. In some cases, the PHY payload has a predetermined format.").

224. Further, I have reviewed Entropic's infringement contentions, which rely on the DOCSIS 3.1 MAC and Upper Layer Protocols Interface Specification (CHARTER_ENTROPIC00369544 - 00370354) ("DOCSIS 3.1"). DOCSIS 3.1 clearly states that "[a] probe is a wideband ***physical-layer signal*** that the CM sends in response to a special probe bandwidth allocation." DOCSIS 3.1 at 59. *See also* Entropic's Second Suppl. Infringement Contentions, Ex. B, at 3 (claim 1, relying on DOCSIS 3.1), 9 (claim 9, also relying on DOCSIS 3.1).

225. Therefore, because "probe" was not interpreted as having the same meaning as "physical layer probe," claim 1 lacks written description and is not enabled.

ii. ". . . wherein the first plurality of parameters at least specify content payload of the probe and a second node." (Claim 1)

226. To the extent that the "second node" specified in claim 1's first plurality of parameters can be the same node that transmitted the probe request, the claim lacks written description support, and an enabling disclosure, for the full scope.

227. The Abstract of the '690 Patent states, "[a]ccording to various embodiments of the disclosed method and apparatus, nodes on a network are programmed to generate a probe transmission in response to a request from the node that will be receiving the probe." '690 Patent, Abstract. Claim 1 of the patent recites "a probe request specifying … content payload of the probe ***and a second node***." The specification, however, does not provide support for the second node to be the transmitter of the probe request.

228. The '690 Patent discloses embodiments whereby a probe is transmitted back to the probe requester. For example, the patent describes a topology with four nodes:

> For example, node 1 may transmit a probe request to each of nodes 2, 3, and 4 specifying a bitloading per subcarrier and a raw data sequence to be used in transmitting the probe. Each of nodes 2, 3, and 4 would then generate the probe

> with the requested bitloading and raw data sequence and transmit the probe to node 1. ***By analyzing this return probe*** and repeating the process if necessary, node 1 can develop bitloading profiles for use on the subcarriers used to communicate with each of nodes 2, 3, and 4.

Id., 5:25-34. Here, however, the specification says nothing about the probe request transmitted by node 1 explicitly specifying node 1 as the node to receive the probe. While the probe request from node 1 to node 2 results in a probe being transmitted from node 2 back to node 1, there is nothing in the specification that teaches that the probe request specifies node 1 (*i.e.*, the probe requester).

229. I contrast the above scenario with another disclosed embodiment, whereby, according to the patent, "the probe request might be transmitted by a different node than the probe receiver." *Id.*, 7:12-13. In this example, "node 2 might generate a probe request ***for node 3 to generate and transmit a specified probe to node 1***. In some embodiments, this is used to determine how communications between node 3 and node 1 could impact communications between node 2 and node 4." *Id.*, 7:14-18. There is no disclosure of a probe request that specifies a second node, whereby the node that requested the probe is the specified second node.

iii. "determining a second plurality of parameters associated with generation and transmission of the probe" (Claim 1)

"generating the probe in accordance with the first plurality of parameters and the second plurality of parameters, wherein the probe has a form dictated by the first plurality of parameters" (Claim 1)

"…wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node." (Claim 9)

"the first plurality of probe parameters comprising a form for the probe including a modulation profile for the probe" (Claim 9)

230. Claims 1 and 9 lack written description support, and fail to satisfy the enablement requirement, because the specification does not disclose or enable "determining a second plurality

of parameters associated with generation and transmission of the probe" (recited in claim 1), "generating the probe in accordance with the first plurality of parameters and the second plurality of parameters . . ." (recited in claim 1), or ". . . wherein the probe is generated in accordance with the first plurality of parameters and in accordance with a second plurality of parameters determined by the second node" (recited in claim 9). The specification does not disclose any "*second* plurality of parameters" that is "associated with generation and transmission of the probe." There is no "plurality of parameters" disclosed that is "associated with generation and transmission of the probe" other than the parameters generated by the probe receiver. These claims do not require that the "second plurality of parameters" be generated by the probe receiver (and if they did, there would be no way to distinguish them from the "first plurality of parameters.").

231. The claims further lack written description, and are not enabling, in view of the Court's finding that claim 1 and claim 9 are not indefinite. The Court relied on Entropic's argument "that the 'second plurality of parameters' could, for example, affect a payload portion of a probe without affecting the form of the probe." CC Order at 47. The specification expressly says that payload *is* a "form" parameter. '690 Patent, 2:3-9; Fig 5; 6:34-38; 7:64-66. The specification does not describe how one could affect the payload portion of the probe without affecting the form of the probe or how, as Entropic specifically argued, parameters could be put into the payload of a probe without affecting the form or a probe. CC Order at 47. I note also that the Court also relied on Entropic's argument that transmission power, for example, is not a form parameter, CC Order at 47, but the specification expressly says that transmission power is a form parameter. '690 Patent, Fig 5, 6:34-38,7:64-66. The fact is, the specification provides no explanation regarding how to distinguish form versus non-form parameters – indeed, the specification would teach a POSITA that all disclosed parameters are "form" parameters. *Id.*, 2:3-9.

iv. "wherein the probe request is generated by a network operator and uploaded to the [second/first] node" (Claims 8 and 16)

232. Claims 8 and 16 require that a "probe request" be "generated by a network operator and uploaded to" a node. The specification neither describes nor enables this.

j. Objective Indicia of Non-Obviousness Regarding the '690 Patent

233. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the '690 Patent that I provided above. I understand that Charter has requested Entropic's positions regarding secondary considerations and objective indicia of nonobviousness, to which Entropic did not provide a substantive, non-conclusory response. To the extent Entropic provides additional information regarding the claims of the '690 Patent, I reserve the right to amend my opinions in response.

XI. The '008 AND '826 PATENTS

a. Background and Summary of the Alleged Invention of the '008 And '826 Patents

234. The '008 and '826 patents, both titled "Method and Apparatus for Spectrum Monitoring," are members of the same patent family and share an identical specification. Both disclose a receiver at a customer premises for receiving, processing and monitoring an incoming signal. ('008 3:5-12.) The received signal can contain solely television channels, solely DOCSIS data channels, or both. (*Id.* 3:12-15.) The architecture of the receiver is depicted in Fig. 1B. (*Id.* 3:5-7.)

235. The '008 patent claims the architecture of a system that monitors "an entire television spectrum" and then reports regarding a characteristic of the television signal to the source of the signal. The '826 patent claims methods of analyzing a television signal carrying multiple channels and then reporting back to the source of the signal based on a determined characteristic of the signal.

b. Priority Date / Date of Conception

236. The ’008 Patent was filed on September 10, 2012 and issued on July 29, 2014. The ’826 Patent was filed on November 23, 2015 and issued on November 21, 2017. Both facially claim priority to Provisional application NO. 61/532,098, which was filed on September 8, 2011.

237. It is my understanding that Entropic claims that both the ’008 Patent and the ’826 Patents are entitled to a priority date of at least as early as February 15, 2011. It is my understanding that Charter disputes this priority date.

c. Claim Construction

i. ’ 008 Patent

238. I understand that the Court has construed the disputed terms of the ’008 Patent as follows:

Term	Court’s Construction
“operable to” (Claims 1-2)	“configured to”
“digitize a received signal spanning an entire television spectrum comprising a plurality of television channels” (Claims 1-2)	Plain meaning.
“signal monitor” (Claims 1-2)	Plain meaning.
“data processor” (Claims 1-2)	Plain meaning.
“channelizer” (Claims 1-2)	Plain meaning.

239. I have reviewed the Court’s constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the ’775 Patent.

ii. ’ 826 Patent

240. I understand that the Court has construed the disputed terms of the ’826 Patent as follows:

Term	Court's Construction
"network management messages" (Claims 1-4 and 6-9)	"messages which report on the network based on the measured characteristics"

241. I have reviewed the Court's constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the '775 Patent.

d. Asserted Claims

i. ' 008 Patent

242. I understand that Entropic accuses Charter of infringing claims 1-6 of the '008 Patent. I discuss below my opinions on the validity of claims 1-2.

ii. ' 826 Patent

243. I understand that Entropic accuses Charter of infringing claims 1-4 and 6-9 of the '826 Patent. I discuss below my opinions on the validity of these claims.

e. Invalidity of the ' 008 Patent Under 35 U.S.C. § § 102 And 103

244. In my opinion, US 2007/0286311 A1 ("CHARTER_ENTROPIC00033947 – 00033957) ("Coyne") discloses or, at least in combination with US 7,528,888 B2 (CHARTER_ENTROPIC00381841 – 00381855)) ("Narita") and US 5,874,992 ("CHARTER_ENTROPIC00033936 – 00033946") ("Caporizzo"), render obvious claims 1-2 of the '008 Patent. Coyne was filed on May 1, 2007 and published on December 13, 2007. Coyne facially claims priority to Provisional Application No. 60/796,464, which was filed on May 1, 2006. Narita was filed on November 29, 2005, published on June 1, 2006, and issued on May 5, 2009. Caporizzo was filed on August 16, 1996 and issued on February 23, 1999. It Claims priority

and is a continuation of the application that matured into US 5,574,495, which was filed October 18, 1995.

245. Coyne discloses "a channelized receiver" having extended capabilities to enable a communications system "to perform electronic surveillance monitoring (ESM)", "receive, process and provide information to downstream devices," provide "wideband communications capability," and which includes "a programmable demodulator for extracting communications data from incoming signals." Coyne at Abstract.

246. Narita discloses a "television broadcast receiver" that "determines the signal strength, the desired to undesired (D/U) ratio, [and] the carrier to noise (C/N) ratio of a received television signal. Based on these values, the television broadcast receiver determines an overall evaluation value indicating the condition of reception of the television signal by reading a receiving condition evaluation table and determines a message explaining the condition of reception of the television signal by reading a message table." Narita at Abstract.

247. Caporizzo teaches "a settop terminal which analyses each data packet received by the settop terminal and determines whether the received data packet includes errors. The bit error rate is continually calculated, monitored and stored. When the bit error rate exceeds a predetermined threshold, the settop terminal generates a warning signal for transmission to the headend, which diagnoses the problem. In this case the cable system can utilize the results from a group of households that have the same problem in order to isolate the source of failure." Caporizzo at 1:64-2:6.

i. Claims 1 Is Invalid in View of Coyne in combination with Narita and Caporizzo.

1. 1[pre] A system comprising:

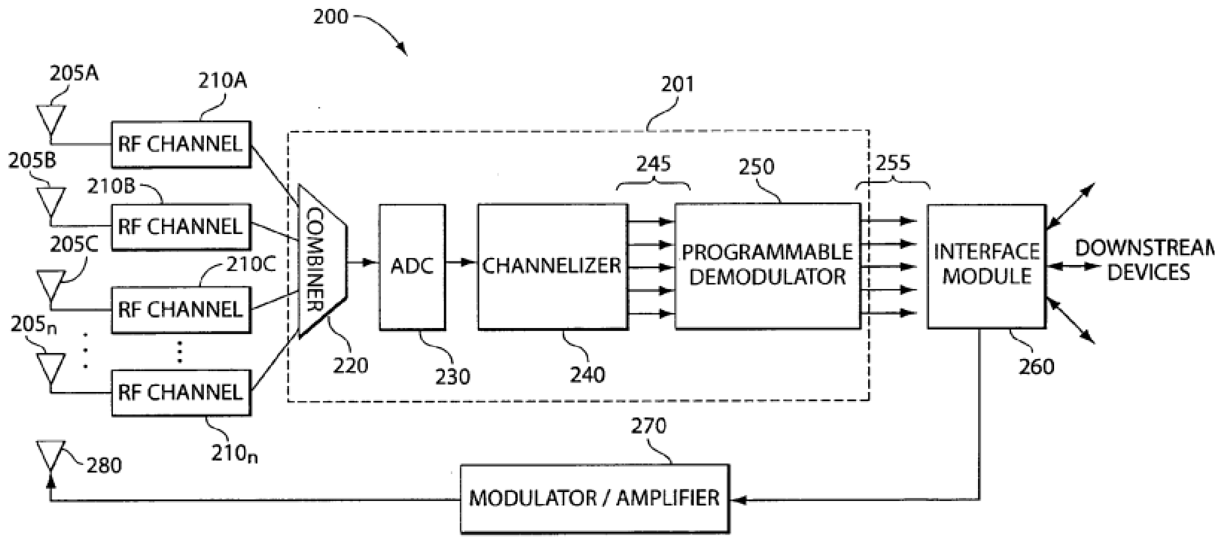
248. I understand that the preamble is not limiting and therefore should not be considered in assessing whether each limitation of claim 1 is taught by the prior art. To the extent the preamble is limiting, in my opinion Coyne discloses or renders obvious this clam limitation.

249. Coyne discloses "a communications system comprises an analog-to-digital converter,[10] a channelizer and at least one circuit." Coyne [¶ 0007]. Coyne further instructs that "the analog-to-digital converter receives an analog input signal and produces a digital representation of the analog input signal." *Id.* Coyne also teaches the use of a channelizer in the system that "receives the digital representation of the analog input signal and produces a plurality of digital output signals, each digital output signal representing a frequency band within a bandwidth of the analog input signal." *Id.*

2. [1a] an analog-to-digital converter operable to digitize a received signal spanning an entire television spectrum comprising a plurality of television channels, said digitization resulting in a digitized signal;

250. Coyne discloses this limitation. Figure 2 of Coyne provides a helpful schematic to orient the POSITA:

[10] The analog-to-digital converter is often abbreviated "ADC."



251. Coyne teaches that a device called the "combiner" (element 220) combines incoming radio frequency signals (Elements 210A through 210_n), which are analog signals, to a wide-band or ultra-wideband spectral space, and outputs them to an analog-to-digital converter. *Id.* [¶¶ 0020-22]. This converter provides "a digital representation of the combined signal" to the channelizer, which converts (*i.e.*, "de-multiplexes") that digital signal into one or more channel outputs. *Id.* [¶ 0022].

252. This channelizer outputs a digital signal spanning "an entire television spectrum" as claimed by the '008 patent. Per Coyne, "[i]f channelizer 240 is used to generate multiple channel outputs, each may span any desired portion of the entire frequency spectrum of interest." *Id.* [¶ 0031].

253. Coyne also discloses that this channelizer has a "filter bank" in which each filter possess a passband spanning some portion of the frequency spectrum of interest.[11] *Id.* [¶ 0004]. Coyne instructs that "[t]he passbands of all filters span the complete spectrum of interest."

[11] In telecommunications, a "filter" is a component that selectively sorts signals and passes through the desired range of signals while suppressing others. The range of frequencies that can pass through the filter are referred to as its "passband."

254. A POSITA would understand that the "complete spectrum of interest" includes the "entire television spectrum" claimed by the '008 Patent. Although the '008 Patent does not define the term "entire television spectrum," it states that the "entire cable downstream" occurs at frequencies in a range "from ~55 MHz to ~1002 MHz." and that "for satellite television", the frequency range is "from ~1 GHz to ~ 2 GHz." '008 Patent, 5:60-65. The '008 Patent does not disclose a television spectrum with frequencies outside these ranges.

255. These frequencies are disclosed by Coyne. For example, Coyne teaches that "[s]ome embodiments of the invention may provide wideband (e.g., up to 512 MHz) or ultra-wideband (e.g., up to 2 GHz) communications capability." Coyne [¶ 0017]. Coyne notes that these frequencies may be divided up multiple different ways. As an example, Coyne states that "a 512 MHz frequency spectrum of interest may be divided into four 128 MHZ channels, eight 64 MHZ channels, five hundred twelve 1 MHZ channels, or any other desired number of portions." *Id.* [¶ 0031] In my opinion, a POSITA would readily understand that this range starts at 1MHz and ends at 512 MHz, even though Coyne does not specifically use this language. A POSITA would readily extrapolate from this example to determine that the particular ranges disclosed by Coyne (which are as great as 2 GHz) constitute the "entire television spectrum" claimed by the '008 Patent. Coyne [¶¶ 0017, 0031].

3. [1b] a signal monitor operable to [1b1] analyze said digitized signal to determine a characteristic of said digitized signal; and

256. Coyne teaches that after the analog signal has been digitized, "a programmable demodulator" is employed to process channel output(s) of a receiver to extract communications data therefrom." *Id.* [¶ 0018]. Coyne also discloses the extraction of communications data (such as a "voice data, video, . . . or a combination thereof.") *Id.* [¶ 0030].

257. The '008 Patent states that the "monitoring module may be operable to analyze the band . . .to measure/determine characteristics such as . . . type and/or amount of modulation. '008 Patent, 3:32-37.

258. The programmable demodulator of Coyne may extract communications data using "any of numerous components . . . . For example, programmable demodulator 250 may comprise one or more field programmable gate arrays (FPGAs), application specific integrated circuits (ASICs), cell processors, programmed procedures executing on a Multi-Processor or Multi-Core PowerPC or other high performance processor(s), other component(s), or a combination thereof." Coyne [¶ 0032].

259. Coyne teaches that the programmable demodulator "may be capable of applying different demodulation algorithms to different channel outputs of channelizer 240. For example, programmable demodulator 250 may apply a Quadrature Phase Shift Keying (QPSK) demodulation algorithm to a first channel output, a Frequency Shift Keying (FSK) demodulation algorithm to a second channel output, another demodulation algorithm to another channel output, and so on." *Id.* [¶ 0034].

260. A POSITA would understand that Coyne's programmable demodulator acts as signal monitor. Although Coyne does not explicitly state that the programmable demodulator "determine[s] a characteristic" of the digitized signal, it inherently teaches this limitation. It would be impossible for the programmable demodulator to perform the above-referenced functionality without measuring "a characteristic of [the] digitized signal." A POSITA would readily understand such functionality would be necessary for the system to be operable.

261. Narita also teaches this limitation. Narita teaches a TV broadcast receiver with a component called a front end that "determines the signal strength, the D/U ratio, and the C/N ratio,

in sequence, of a received TV signal (#1 to #3), and outputs the determined signal strength, D/U ratio, and C/N ratio to the controller 16." [12] Narita at 5:12-16; *see also id.,* 6:1-4 ("Further, the TV broadcast receiver 1 updates and presents to a user the signal strength, the D/U ratio, and the C/N ratio of a received TV signal in sync with each other as well as the overall evaluation value 50 for the TV signal."). The signal strength, D/U ratio, and C/N ratio are all "characteristics" of the digitized signal.

262. Narita does not explicitly state that a digitized signal, rather than the analog signal, is analyzed for these characteristics by the front end. However, this would have been apparent to a POSITA for at least two reasons.

263. First, Narita describes that the TV signal is a digital TV signal rather than an analog TV signal in the preferred embodiment. *See id.,* 7:39-50. In the preferred embodiment, the front end determines the characteristic of a digitized signal rather than an analog signal.

264. Second, Narita discloses that (a) the TV broadcast receiver may receive analog signals rather than digital signals; and (b) the front end may include an analog-to-digital converter. *Id.,* 3:62-67, 7:39-50. Even if the characteristics of the analog signal were measured by the front end prior to being converted to a digitized signal, Narita discloses that these values are reported to a "controller" that "determines" these characteristics:

> When the receiving condition information presenting process is started, the front end 12 of the TV broadcast receiver 1 determines the signal strength, the D/U ratio, and the C/N ratio, in sequence, of a received TV signal (#1 to #3), and outputs the determined signal strength, D/U ratio, and C/N ratio to the controller 16. Based on the signal strength, the D/U ratio, and the C/N ratio received from the front end 12, ***the controller 16 determines an overall evaluation value 50 for the received TV***

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[12] The D/U ratio refers to the desired-to-undesired channel ratio, which is a measure of the strength of the broadcast signal for a particular channel compared with the strength of undesired broadcast signals in the same channel. The C/N ratio refers to the carrier-to-noise ratio, which is used in measuring the amount of noise in satellite communications.

> ***signal*** by reading the receiving condition evaluation tables 51 to 56 (#4). ***Then, based on the signal strength, the D/U ratio, and the C/N ratio, the controller 16 determines one (or two) of the messages 61 to 72 that corresponds to the condition of the reception of the TV signal*** by reading the message table 60 (#5).

Id., 5:11-23 (emphasis mine). Narita places the analog-to-digital converter within the front end (*Id.,* 3:62-67), and because the controller receives the converted, digitized signal from the front end, the controller is only determining the characteristic of a digitized signal, not an analog signal. Therefore, a POSITA would therefore understand the that either the front end or the controller from Narita may act as a signal monitor.

265. Accordingly, either Coyne alone or Coyne in view of Narita discloses this limitation.

4. [1b2] report said determined characteristic to a source of said received signal;

266. Coyne instructs that the interface module (element 260) may send extracted communications data downstream to one or more user-devices, while also taking information from those devices and transmitting it outbound via a "modulator/amplifier." Coyne [¶ 0023] ("Interface module 260 may also receive output from one or more downstream devices and provide it to modulator/amplifier 270, which prepares the output for transmission and provides it to transmission antenna 280."), [¶ 0040] (As shown in FIG. 2, in some embodiments, system 200 may be capable of transmitting information (e.g., from any downstream device) via antenna 280. Specifically, interface module 260 may provide information to modulator/amplifier 270, which may prepare the information for transmission via antenna 280 by modulating the information (employing any Suitable modulation scheme), converting it from digital to analog form, amplifying the analog signal, and providing the analog signal to antenna 280.").

267. Although Coyne does not explicitly disclose transmitting the signal back to the source, such technology was well-known in the art for at least a decade prior to when Coyne was

filed. Caporizzo, for example, teaches the transmission of a warning signal to a headend to diagnose problems over a cable network.

268. Caporizzo teaches that the "determined characteristic" is the bit error rate, which measures interference over a network. Caporizzo instructs that "the received data packet includes errors. The bit error rate ("BER") is continually calculated, monitored and stored. When the BER exceeds a predetermined threshold, the settop terminal generates a warning signal for transmission to the headend, which diagnoses the problem." Caporizzo at 1:67-2:3. Per Caporizzo, "the bit error rate may increase during certain times of the day due to atmospheric conditions, or may be greater on certain frequencies due to interference caused by external RF energy sources." *Id.,* 5:64-67.

269. I further observe that the BER was contemplated by the inventors of the '008 Patent as being one of the "characteristics" referenced in the '008 Patent. For example, claims 5 and 13 claim that "one or more characteristics" of the signal may be the "bit error rate."

270. In my opinion, a POSITA would be highly motivated to combine Coyne with Caporizzo. Caporizzo discloses a method for reducing the number of technician visits to a subscriber, or "truck rolls" that a cable provider needs to make to diagnose problems in an HFC network. Caporizzo (a) identifies this as a known problem in the art, *id.,* 1:33-41 ("[a]lthough a technician may be dispatched to the subscriber's household, the problem may not originate with that particular subscriber's settop terminal. On the contrary, an entire portion of the CATV system may be inoperable. Accordingly, it is difficult for CATV network operators to effectively monitor the operation of the system and to quickly determine the location of problems in order to prevent system-wide failure."); and (b) teaches that sending a signal upstream solves that problem. *Id.,* 6:21-27 ("If the BERs for subscribers 504-511 are abnormally high, and the BERs for subscriber 500-503 and 512-527 remain within average parameters, components 110 and 530 are the likely

cause of the problem. Accordingly, a repair technician will be immediately dispatched to this location to perform a diagnostic test of these CATV transmission network components.").

5. [1c] a data processor operable to process a television channel to recover content carried on the television channel; and

271. Coyne teaches that the channelizer may de-multiplex the output of the analog-to-digital converter to produce "multiple channel outputs," which may include different communication sets such as voice data, video data, and so on. *Id.* [¶ 0030]. The communications data from these outputs are extracted by the programmable demodulator, which incorporates a data processor. *Id.* [¶ 0032]. Specifically, Coyne states that the "programmable demodulator 250 may comprise one or more field programmable gate arrays (FPGAs), application specific integrated circuits (ASICs), cell processors, programmed procedures executing on a Multi-Processor or Multi-Core PowerPC or other high performance processor(s), other component(s), or a combination thereof." *Id.* Thus, Coyne teaches that the programmable not only has the functionality to operate as a signal monitor, as set forth in Section XI.e.i.3, it also acts as the claimed data processor as well.

272. A POSITA would further understand that these channel outputs may include television channels (which comprise at least voice and video data), and that even though Coyne does not explicitly say the word "television," it inherently discloses processing a television channel to recover content from that channel based on the types of communication sets that Coyne discloses, which are referenced above. *Id.* [¶ 0030]. As stated above in Section XI.e.i.2, a POSITA would understand that the "complete spectrum of interest" from Coyne, *id.* [¶¶ 0004, 0031], includes the "entire television spectrum" claimed by the '008 Patent. Although the '008 Patent does not define the term "entire television spectrum," it states that the "entire cable downstream" occurs at frequencies in a range "from ~55 MHz to ~1002 MHz." and that "for satellite television",

the frequency range is "from ~1 GHz to ~ 2 GHz." '008 Patent, 5:60-65. These frequencies are disclosed by Coyne.

273. In my opinion, "an Engineer with at least a Bachelor's Degree in Electrical Engineering (or equivalent), with at least two years of experience developing broadband/cable TV/satellite communication systems and solutions"—which is the POSITA that Entropic described—would certainly know that the frequencies ranges at which television signals are broadcast. Plaintiff's CC Br. at 6.

6. [1d] a channelizer operable to:

274. As set forward in Section XI.e.i.2, Coyne discloses a channelizer. Per Coyne, "ADC 230 provides digital output to channelizer 240, which de-multiplexes the output in the digital domain to produce, as an example, multiple channel outputs. Although described with reference to FIG. 1 as performing filtering according to frequency band, channelizer 240 may produce channelized output using any a priori knowledge, as the invention is not limited to any particular implementation." *Id.* [¶ 0030].

7. [1d1] select a first portion of said digitized signal;

275. Coyne teaches that the channelizer may "generate multiple channel outputs" which it may determine "using any a priori knowledge." *Id.* [¶¶ 0030-31]. Coyne also teaches that "[i]n some embodiments, channelizer 240 de-multiplexes the output of ADC 230 to separate it into different communication sets, such as voice data, video, data streams, other information, or a combination thereof." *Id.*

276. Coyne further discloses that if the channelizer is used to generate multiple channel outputs, "each may span a [sic] any desired portion of the entire frequency spectrum of interest. For example, a 512 MHz frequency spectrum of interest may be divided into four 128 MHZ channels, eight 64 MHZ channels, five hundred twelve 1 MHZ channels, or any other desired

number of portions. Of course, each portion need not span the same percentage of the entire frequency spectrum of interest. For example, a 512 MHz frequency spectrum of interest might be divided into one 256 MHZ channel and four 64 MHZ channels." *Id.* [¶ 0031].

277. Therefore, a POSTIA would readily understand that the channelizer is able to select multiple portions of a digital signal, including the claimed "first portion" of the signal.

8. [1d2] select a second portion of said digitized signal; and

278. For the reasons stated immediately above in Section XI.e.i.7, a POSITA would understand that the channelizer is able to select multiple portions of a digital signal, including the claimed "second portion" of the signal.

9. [1d3] concurrently output said first portion of said digitized signal to said signal monitor and said second portion of said digitized signal to said data processor.

279. As stated above in Sections XI.e.i.3 and XI.e.i.5, a POSITA would understand that the programmable demodulator acts as both the signal monitor and the data processor. Coyne teaches that after the channelizer selects the first and second portions of the digitized signal, is output "is provided to [the] programmable demodulator 250." *Id.* [¶ 0032].

280. A POSITA would further understand that each portion of the signal may be output in serial or "concurrently" in parallel. In particular, Coyne teaches that the "ADC 230 may generate a parallel bit stream representing the signal, although the invention is not limited to such an implementation. One or more serial bit streams may additionally or alternatively be provided." *Id.* [¶ 0029]. Coyne does not indicate that the channelizer converts the bit stream from parallel back to serial, and so a POSITA would understand that Coyne inherently teaches that signals are sent to the programmable demodulator in parallel (*i.e.*, "concurrently."). Therefore, Coyne discloses this limitation as well.

i. Claim 2 Is Invalid in View of Coyne in combination with Narita and Caporizzo.

1. [2] The system of claim 1, wherein said first portion of said digitized signal spans said entire television spectrum.

281. As I discussed above, Coyne in combination with Narita and Caporizzo would have rendered claim 1 obvious. *See supra* at Section XI.e.i.

282. For the reasons set forth in Section XI.e.i.2, a POSITA would understand that digital signal selected by the channelizer may well span the entire spectrum.

f. Invalidity of the ' 826 Patent Under 35 U.S.C. § § 102 And 103

283. In my opinion, Coyne discloses or, at least in combination with Caporizzo and US 7,403,486 ("CHARTER_ENTROPIC00035057 – 00035086") ("Flask"), renders obvious claims 1-3, 8-9 of the '008 Patent. Coyne discloses or, at least in combination with Caporizzo, Flask, and DOCSIS 2.0, renders obvious claims 4 and 7. Coyne discloses, or, at least in combination with Caporizzo and US 2007/0052406 A1 ("CHARTER_ENTROPIC00380664 – 00380675) ("Payne"), renders obvious claim 6.

284. Brief summaries of Coyne and Caporizzo are set forth at the beginning of Section XI.e. DOCSIS 2.0 is summarized in Section X.g,

285. Flask was filed on November 1, 2004 and issued on July 22, 2008. It teaches "[a]n apparatus that includes a coupling, a signal level measurement circuit, a communication circuit and a processing circuit. The coupling is configured to connect to and received broadband RF signals from a coaxial cable termination of a communication network. The signal level measurement circuit is operably coupled to the coupling, and is operable to generate signal level measurements regarding a first set of the broadband RF signals." Flask at Abstract.

i. Claim 1 is Invalid in View of Coyne in combination with Caporizzo and Flask.

1. [1pre] A method comprising:

286. I understand that the preamble is not limiting and therefore should not be considered in assessing whether each limitation of claim 1 is taught by the prior art. To the extent the preamble is limiting, in my opinion Coyne discloses or renders obvious this clam limitation.

287. Coyne discloses "a communications system comprises an analog-to-digital converter,[13] a channelizer and at least one circuit." Coyne [¶0007]. Coyne further instructs that "the analog-to-digital converter receives an analog input signal and produces a digital representation of the analog input signal." *Id.* Coyne also teaches the use of a channelizer in the system that "receives the digital representation of the analog input signal and produces a plurality of digital output signals, each digital output signal representing a frequency band within a bandwidth of the analog input signal." *Id.*

2. [1a] performing by one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network:

288. As set forth throughout Section XI.e.i.2, a POSITA would readily understand that Coyne discloses a receiver that operates with one or more circuits that is coupled to a "television and data service provider."

289. Coyne, which is focused on RF signals, does not explicitly state that the receiver is coupled to a headend. Nevertheless, Caporizzo does. It teaches a "CATV transmission network 5 [that] begins with a plurality of coaxial or fiber optic trunk lines 40 coupled to the headend 15. Some portions of the CATV plant may use fiber optic cables instead of coaxial transmission

[13] The analog-to-digital converter is often abbreviated "ADC."

cables." Caporizzo 2:46-49. For the reasons set forth in Section XI.e.i.4, A POSITA would be highly motivated to combine Coyne with Caporizzo.

290. Caporizzo, first filed in 1996, instructs the use of "coaxial ***or*** fiber optic cables," *Id.* (emphasis), At the time Caporizzo was filed, HFC networks were relatively nascent. Ultimately, they quickly came into widespread use. For example, Flask, which was filed in 2004, teaches that "[ma]any cable networks further include a substantial portion of fiber optic lines. Such networks are known as hybrid fiber coax or HFC networks. Such networks are common." Flask at 1:39-36. A POSITA, seeing Caporizzo's reference to the use of "coaxial or fiber optic cables" would be well aware of HFC networks like those disclosed in Flask by the priority date of the '826 Patent.

291. Accordingly, Coyne in combination with Caporizzo and Flask render this limitation obvious.

3. [1a1] receiving, via said HFC network, a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels;

292. As set forth in Section XI.e.i.2, Coyne discloses a signal that carries a plurality of channels, including television channels and data channels.

293. For the reasons set forth in Section XI.f.i.2, HFC networks were well-known by the priority date of the '826 Patent, and POSITA would have been motivated to combine Coyne with Caporizzo to obtain the claimed functionality. Accordingly, this limitation would be obvious to a POSITA.

4. [1a2] digitizing said received signal to generate a digitized signal;

294. For the reasons set forth in Section XI.e.i.2, Coyne discloses this limitation or renders it obvious.

5. [1a3] selecting a first portion of said digitized signal;

295. For the reasons set forth in Section XI.e.i.7, Coyne discloses this limitation or renders it obvious.

6. [1a4] selecting a second portion of said digitized signal;

296. For the reasons set forth in Section XI.e.i.8, Coyne discloses this limitation or renders it obvious.

7. [1a5] processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

297. For the reasons set forth in Section XI.e.i.5, Coyne discloses this limitation or renders it obvious.

8. [1a6] analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

298. For the reasons set forth in Section XI.e.i.3, Coyne discloses this limitation alone.

299. As previously mentioned in Section XI.e.i.4, Caporizzo also discloses a method for measuring the bit-error rate of a digitized signal. I further observe that the BER was contemplated by the inventors of the ’826 Patent as being one of the “characteristics” referenced in the ’008 Patent. For example, claims 8 and 17 claim that “one or more characteristics” of the signal may be the “bit error rate.”

9. [1a7] controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages.

300. Caporizzo instructs that “the data to be monitored by the preferred embodiment of the present invention is embedded at the headend 15 within the VBI of a television signal. As is well known to those skilled in the art, the VBI may include special reference signals that are located

on various lines of the VBI. Several common signals include the vertical interval test signal (VITS), vertical interval reference signal (VIRS), and the close caption signal (CC)." Caporizzo at 30-38. These are network management messages, which I understand that court has construed as "messages which report on the network based on the measured characteristics." CC Order at 29.

301. Caporizzo further instructs that "As data [from these VBI signals] is received by the microprocessor 138, the total number of received bytes are counted by a first counter 148. The microprocessor 138 then determines whether or not the received bit of data contains an error." Caporizzo at 401-45. If there is an error, and if that error exceeds a "predetermined threshold," Caporizzo teaches that "the settop terminal generates a warning signal for transmission to the headend, which diagnoses the problem." *Id.,* 1:67-2:3.

302. Caporizzo therefore discloses this limitation or renders it obvious.

ii. Claim 2 is Invalid in View of Coyne in combination with Caporizzo and Flask.

1. [2] The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.

303. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

304. As set forth above in Section XI.f.i.9, Caporizzo discloses this claim or renders it obvious. A POSITA would understand that the claimed "acceptable bounds" is the same as the "predetermined threshold" taught by Caporizzo. *Id.,* 1:67-2:3.

iii. Claim 3 is Invalid in View of Coyne in combination with Caporizzo and Flask.

1. [3] The method of claim 2, wherein said parameter is a modulation parameter of said received signal.

305. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

306. It should first be noted that although "modulation parameter" can be a numerical value, it need not be. A modulation parameter could be a modulation type, a reference to a modulation source, modulation frequency, and/or modulation bandwidth. These modulation parameters do not necessarily have an upper or lower bound where a measurement could determine whether the parameter is outside of acceptable bounds. The limitation of dependent Claim 3 may or may not make technical sense when referring back to Claim 2, depending on the type of parameter selected.

307. Given that understanding, it is my opinion that a POSITA would understand that the modulation parameter of Claim 3 could be part of a management message but would not necessarily need to be considered to be out of acceptable bounds.

308. Coyne teaches that after the analog signal has been digitized, "a programmable demodulator" is employed to process channel output(s) of a receiver to extract communications data therefrom." *Id.* [¶ 0018]. Coyne also discloses the extraction of communications data (such as a "voice data, video, . . . or a combination thereof.") *Id.* [¶ 0030].

309. The programmable demodulator of Coyne may extract communications data using "any of numerous components . . . . For example, programmable demodulator 250 may comprise one or more field programmable gate arrays (FPGAs), application specific integrated circuits (ASICs), cell processors, programmed procedures executing on a Multi-Processor or Multi-Core

PowerPC or other high performance processor(s), other component(s), or a combination thereof." Coyne [¶ 0032].

310. Coyne teaches that the programmable demodulator "may be capable of applying different demodulation algorithms to different channel outputs of channelizer 240. For example, programmable demodulator 250 may apply a Quadrature Phase Shift Keying (QPSK) demodulation algorithm to a first channel output, a Frequency Shift Keying (FSK) demodulation algorithm to a second channel output, another demodulation algorithm to another channel output, and so on." *Id.* [¶ 0034].

311. A POSITA would understand that Coyne's programmable demodulator acts as signal monitor, and specifically, as a monitor of a modulation parameter (which can be a type of modulation) like QPSK. Although Coyne does not explicitly state that the programmable demodulator "determine[s] a parameter" of the digitized signal, it inherently teaches this limitation.

312. Coyne instructs that the interface module (element 260) may send extracted communications data downstream to one or more user-devices, while also taking information from those devices and transmitting it outbound via a "modulator/amplifier." Coyne [¶ 0023] ("Interface module 260 may also receive output from one or more downstream devices and provide it to modulator/amplifier 270, which prepares the output for transmission and provides it to transmission antenna 280."), [¶ 0040] (As shown in FIG. 2, in some embodiments, system 200 may be capable of transmitting information (e.g., from any downstream device) via antenna 280. Specifically, interface module 260 may provide information to modulator/amplifier 270, which may prepare the information for transmission via antenna 280 by modulating the information

(employing any Suitable modulation scheme), converting it from digital to analog form, amplifying the analog signal, and providing the analog signal to antenna 280.”).

313. A POSITA would understand that this “outbound” transmitting technique could be used in the form of a network management message to be sent back to a headend. Coyne discloses this limitation.

iv. Claim 4 is Invalid in View of Coyne in combination with Caporizzo, Flask, and DOCSIS 2.0

1. [4] The method of claim 2, wherein said parameter is a transmit power of said received signal.

314. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

315. It must be noted that the limitation as stated would not be understood by a POSITA. A “received signal” has no “transmit power” component. It has a received power and there is certainly a “transmit power” of the transmitter that was the source of the received signal.

316. That said, if the limitation is construed to mean the transmit power of the signal from the source of the received signal, or the power transmitted by the headend, then DOCSIS 2.0 discloses this limitation.

317. A DOCSIS 2.0 Ranging Request (RNG_REQ)[14] includes Power Level Adjust information that is part of the message that is sent to one or more cable modems (CM). In response, the CM would reply with a RNG-RSP message which includes Power Level Adjust information relative to the received signal. A POSITA would understand that the technique used to create those data fields in the RNG-REQ and RNG-RSP messages could be modified to include absolute power

[14] DOCSIS 2.0, Page 150, Power Level Adjust.

levels and used in combination with Coyne to meet the limitation in Claim 2 where "wherein said parameter is a transmit power of said received signal."

v. Claim 6 is Invalid in View of Coyne in combination with Caporizzo, Flask, and Payne.

1. [6] The method of claim 1, wherein said characteristic is signal power vs. frequency.

318. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

319. Payne teaches "Broadcast Receiver Having Integrated Spectrum Analysis." The Abstract describes a "receiver for receiving a broadcast channel comprising a spectrum analyzer physically integrated into the receiver…."

320. Paragraph 32 in Payne discloses "spectrum data can be transmitted over a communications channel back to a master control site." It goes on to disclose "an integrated spectrum analyzer at the receiver may send spectrum data back to the control center." A POSITA would first understand that a spectrum analyzer is an electronic test instrument that computes and presents a power vs. frequency data set or characteristic. A POSITA would understand that in the context of Coyne, when considering a HFC Network, with management messages, that Payne's disclosure of "send data back to the control center" discloses "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages." A POSITA would also understand that the actual measurement data of the received power vs. frequency spectrum would be unique and inherently different than anything messaged in "said management messages."

vi. Claim7 is Invalid in View of Coyne in combination with Caporizzo, Flask, and DOCSIS 2.0.

1. [7] The method of claim 1, wherein said characteristics is signal phase vs. frequency.

321. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

322. It must be first noted that a POSITA would understand that the term "phase vs. frequency" in this limitation must refer to a relative phase difference between two physically separated points across a set of frequencies. It is extremely difficult to measure relative phase vs frequency response over a long (e.g. thousands of feet or greater) due to the challenge of looking/measuring at both sides at the same time. The phase response of an HFC channel, with regard to a receiver, e.g in a cable a cable modem, is often determined by "reading the taps/coefficients" of the adaptive equalizer used in a receiver (at either end of the HFC network). The settings of these taps/coefficients are indicative of the phase vs. frequency response of the HFC Channel. These are sometimes sent by the headend to proactively "undo" the phase distortion in the channel seen by the cable modem receiver.

323. DOCSIS 2.0 Specification discloses the use of equalization, and the identification of the equalizer coefficients to determine/correct phase vs frequency response, in cable modem receivers, on Pp. 95 and 96.

324. A POSITA would understand that reading the appropriate equalizer coefficients in a receiver and sending them back to the CMTS (headend) would disclose "wherein said characteristics is signal phase vs frequency.

vii. Claim 8 is Invalid in View of Coyne in combination with Caporizzo and Flask.

1. [8] The method of claim 1, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.

325. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

326. Caporizzo instructs that "the data to be monitored by the preferred embodiment of the present invention is embedded at the headend 15 within the VBI of a television signal. As is well known to those skilled in the art, the VBI may include special reference signals that are located on various lines of the VBI. Several common signals include the vertical interval test signal (VITS), vertical interval reference signal (VIRS), and the close caption signal (CC)." Caporizzo at 30-38. These are network management messages, which I understand that court has construed as "messages which report on the network based on the measured characteristics." CC Order at 29.

327. Caporizzo further instructs that "As data [from these VBI signals] is received by the microprocessor 138, the total number of received bytes are counted by a first counter 148. The microprocessor 138 then determines whether or not the received bits of data contains an error." Caporizzo at Col. 4:1-45. If there is an error, and if that error exceeds a "predetermined threshold," Caporizzo teaches that "the settop terminal generates a warning signal for transmission to the headend, which diagnoses the problem." *Id.,* 1:67-2:3

328. Caporizzo therefore discloses this limitation or renders it obvious.

viii. Claim 9 is Invalid in View of Coyne in combination with Caporizzo and Flask.

1. [9] The method of claim 1, configuring, by said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.

329. As I discussed above, Coyne in combination with Caporizzo and Flask would have rendered claim 1 obvious. *See supra* at Section XI.f.i.

330. Coyne discloses "a communications system comprises an analog-to-digital converter,[15] a channelizer and at least one circuit." Coyne [¶ 0007]. Coyne further instructs that "the analog-to-digital converter receives an analog input signal and produces a digital representation of the analog input signal." *Id.* Coyne also teaches the use of a channelizer in the system that "receives the digital representation of the analog input signal and produces a plurality of digital output signals, each digital output signal representing a frequency band within a bandwidth of the analog input signal."

331. Coyne, at paragraph 4 discloses a receiver 100 includes a channelizer having a filter bank in which each filter possesses a passband spanning some portion of the frequency spectrum of interest." A POSITA would understand that a bandpass filter, used in Coyne's channelizer, "configures" the bandwidth and/or center frequency of a portion of a digitized frequency spectrum. Caporizzo therefore discloses this limitation or renders it obvious.

---

[15] The analog-to-digital converter is often abbreviated "ADC."

g. Invalidity of the ’008 Patent and the ’826 Patent Under 35 U.S.C. § 101[16]

332. For the reasons set forth below, all claims of the ’008 Patent and the’826 Patent are, in my opinion, invalid for lack of patentable subject matter (either as system in the case of the ’008 Patent, or a method in the case of the ’826 Patent).

333. Claims 1 and 2 of the ’008 Patent, of which claim 1 is independent and representative, recite a system comprising a number of conventional components used to conduct “spectrum monitoring.” (*e.g.*, analog-to-digital converter, signal monitor, data processor, and channelizer). ’008 Patent, claim 1; *id.* at 1:54-57 (“A system and/or method is provided for spectrum monitoring, substantially as shown in and/or described in connection with at least one of the figures, as set forth more completely in the claims.”).

334. Claims 1-4 and 6-9 of the ’826 Patent, of which claim 1 is independent and representative, recite a method comprising a number of steps to conduct the same process.

335. The common specification of these two patents does not disclose how the claimed system and method are in some way new or otherwise an improvement over other existing prior art beyond a cursory explanation in the text emphasized below:

> Network-based services can become unacceptable if network parameters fall outside of those for which receivers in the network were designed. For example, in a cable television system there are specifications for the number of channels on the plant, the types of channels, the signal levels of those channels and the impairments that can be on the plant that would affect the performance of the receiver. If some or all of these parameters deviate outside acceptable bounds, the user may experience unacceptable performance. ***Conventional methods and apparatuses for monitoring network parameters are too costly and impractical for use in customer-premises equipment (CPE)***.

’008 Patent at 1:34-45.

[16] The ’008 Patent and the ’826 Patent share identical specifications, and so reference is made to the specification of the ’008 Patent throughout for convenience.

336. The common specification for the patents does not instruct as to how or why these "conventional methods and apparatus are too costly and impractical," it just declares them to be so. It does not instruct what these conventional methods and apparatus are.

337. Ultimately, the two patents are directed toward an abstract idea: they disclose a system or method to (a) recover data in a received signal; (b) determine a characteristic of the received signal; and (c) report that characteristic (or a characteristic based on the determined characteristic) back to the source of the signal.

338. By way of example, claim 1 of the '826 Patent simply "perform[s] by one or more circuits" to digitizing a television signal, selecting a first and second portion of the signal, processing the second portion to recover the TV content, analyzing the first portion to measure a characteristic of the signal, and transmitting a network management message to the headend based on the measured characteristic. That was well-known in the prior art. *See* Sections XI.e and XI.f.

339. Claim 1 recites generic steps that, at bottom, involve nothing more than the manipulation of data. For example:

> ***digitizing*** said received signal to generate a digitized signal;
>
> ***selecting*** a first portion of said digitized signal;
>
> ***selecting*** a second portion of said digitized signal;
>
> ***processing*** said selected second portion of said digitized signal to recover information carried in said plurality of channels;
>
> ***analyzing*** said selected first portion of said digitized signal to measure a characteristic of said received signal; and
>
> ***controlling*** the transmission of network management messages back to said headend based on said measured characteristic of said received signal . . . .

340. Importantly, the claim, as recited does not specify in any way ***how*** the steps of "digitizing," "selecting," "processing," "analyzing," and "controlling" are performed. The claims

are all recited at a high level of generality and fail to give any indication of how the method improves the functionality of the cable network. And, as previously stated, the common specification does not include any disclosure on what problem these steps from the ’826 Patent even aim to solve.

341. Similarly, the system recited in Claim 1 of the ’008 Patent has an analog to digital converter to digitize a signal, a channelizer that selects first and second portions of the signal and concurrently outputs them, respectively, to a signal monitor and data processor; the signal monitor analyzes the signal to determine a characteristic of the signal and reports that characteristic to the source of the signal, and the data processor processes the signal to recover content. As construed by the Court, the channelizer, signal monitor and data processor do not have to be separate - they can all be the same device.

342. There is no inventive concept pertaining to the use of these generic computer components (such as the analog-to-digital converter, the signal monitor, the data processor, or the channelizer) that transforms the abstract idea in the ’008 patent into something new or innovative. Rather, Claim 1 merely recites what these various components do.

343. The asserted dependent claims of the either patent do not transform claim 1 into something new or innovative. For the ’826 Patent, each dependent claim simply provides different examples of the characteristic or parameter that can be measured or determined by the convention signal monitor.

344. Claim 2 of the ’008 Patent merely states that the “first portion of said digitized signal” spans the entire TV spectrum, and there is no indication in the specification as to how or why that is an improvement upon the prior art.

345. These devices were well-known in the art for the reasons set forward throughout Sections XI.e (setting forth novelty and obvious opinions for the two patents), and each and every component and step claimed by the two patents were well-known in the art before the priority date of the ’008 Patent and the’826 Patent.

346. Accordingly, it is my opinion that the asserted claims in both ’008 Patent and the’826 Patent are invalid as ineligible subject matter.

h. Invalidity of the ’008 Patent and the ’826 Patent Under 35 U.S.C. § 112

347. For the reasons set forth below, I believe claims 1-2 of the ’008 Patent and claims 1-4, and 6-9 of the ’826 Patent are invalid or for lack of enablement and written description.

i. The ’008 Patent

1. “signal monitor,” “data processor” and “channelizer” (Claims 1-2)

348. Claims 1 and 2 of the ’008 Patent are also invalid for lack of written description and enablement. The claims describe (i) a “signal monitor” operable to determine a characteristic of the digitized signal, (ii) a “data processor” operable to recover content carried on a television channel, and (iii) a “channelizer” that is operable to “concurrently output” selected portions of the digitized signal to the signal monitor and the data processor. In construing the claims, the court rejected Charter’s argument that the “signal monitor,” the “data processor,” and the “channelizer” are separate pieces of hardware. Claim Construction Order at 36. The Court found that “the patentee did not express or imply any physical separation” between these three components. *Id.* As so construed, the patent does not describe or enable the full scope of the claims. The patent does not teach an arrangement in which the signal monitor, the data processor and the channelizer are not physically separate, and it additionally does not disclose such an embodiment whereby the channelizer can nonetheless, in some way, “concurrently output” portions of the television signal

to the signal monitor and to the data processor as required by the claims. The word "output," by definition, means output from a device. *E.g.*, *Output*, Dictionary.com, https://www.dictionary.com/browse/output (last visited July 20, 2023) (defining "output" as "information in a form suitable for transmission from internal to external units of a computer, or to an outside medium."). This is exactly what it means in the specification of the '008 patent.

349. The specification teaches that the monitoring device and data processing device are in a "parallel arrangement" and "concurrently process[]" the signals they receive. '008 Patent, 4:7-10; 4:45-50. In fact, it is the "parallel arrangement" that provides the purported benefit of being able to determine signal/channel characteristics without having to interrupt service to the user equipment. '008 Patent, 4:7-10. No other embodiment is disclosed. For this additional reason, the claims as construed by the Court lack written description and enablement.

350. The claims also require that the signal monitor be operable to "report said determined characteristic to a source of said received signal." This is not described or enabled in the specification. The specification teaches that the signal monitor controls the transmission of network management messages. '008 Patent, 3:48-51, not that it reports any determined characteristics..

ii. The '826 Patent

1. "controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages." (Claims 1-9)

351. I understand that the Court construed the term "network management messages" to mean "messages which report on the network based on the measured characteristics." CC Order at 29. According to the Court's claim construction order, the Court held that "simply sending the

measured characteristic back to the headend is insufficient to meet this claim limitation." CC Order 28. In doing so, the Court rejected Entropic' s argument that a network management message is different than the characteristic it conveys simply because the message is the conveyor of the characteristic and as such inherently contains more information. I note here that, had the Court accepted Entropic's position, the claim would lack written description and enablement, as the specification discloses nothing about the concept of a network management message being different than the information it contains. By Entropic's logic, it would always be true that the "measured characteristic is different than the network management message." The limitation would be superfluous.

352. The specification does teach that instead of sending the measured characteristic back the headend, an indication can be sent that the measured characteristic is "outside acceptable bounds." (3:48-57). That is the only disclosure of sending something back to the headend other than the measured characteristic itself. As such, however, there is no support for the full scope of this claim limitation, which is not limited to sending "outside acceptable bounds" indications.

2. Claim 3

353. In my opinion, this claim is also invalid due to lack of both enablement and written description for the additional reasons that the specification does not disclose or enable "said parameter is a modulation parameter of said received signal.

3. Claim 4

354. In my opinion, this claim is invalid due to lack of both enablement and written description for the additional reasons that the specification does not disclose or enable "said parameter is a transmit power of said received signal."

4. Claim 7

355. In my opinion, this claim is invalid due to lack of both enablement and written description for the additional reasons that the specification does not disclose or enable "said characteristics is signal phase vs. frequency."

5. Claim 8

356. In my opinion, this claim is invalid due to lack of both enablement and written description for the additional reasons that the specification does not disclose or enable "said characteristic is" "peak-to-average ratio," "noise levels," "bit error rate," or "symbol error rate."

i. Objective Indicia of Non-Obviousness Regarding the '008 and '826 Patents

357. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the '008 and '826 Patents that I provided above. I understand that Charter has requested Entropic's positions regarding secondary considerations and objective indicia, to which Entropic did not provide any response. To the extent Entropic provides additional information regarding the claims of the '008 and '826 Patents, I reserve the right to amend my opinions in response.

XII. The '362 PATENT

a. Background and Admitted Prior Art

358. U.S. Patent No. 9,210,362 (ENTROPIC_CHARTER_0000549 – 0000567) (the "'362 Patent") purports to solve problems with conventional wideband tuners, such as the tuner depicted in FIG. 1:

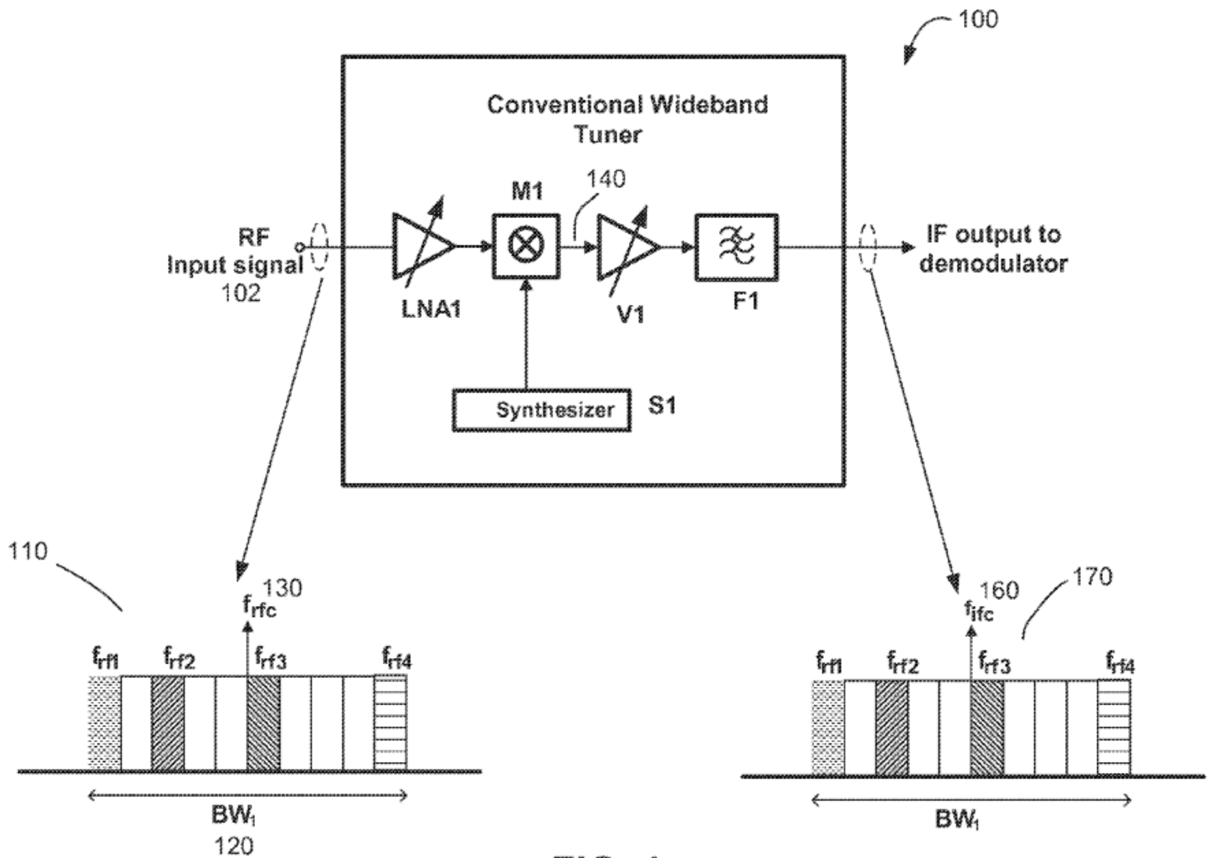


FIG. 1
(Prior Art)

359. According to the '362 Patent, such conventional tuners receive an RF signal "including multiple desired channels that are located in non-contiguous portions of a radio frequency spectrum." '362 Patent, 1:65-67. For example, as shown in in FIG. 1, a "swath of channels 110 occupies a bandwidth BW1 120 at an RF center frequency f_{rfc} 130." *Id.*, 1:67-2:2. Meanwhile, "[s]ynthesizer S1 may be tuned to a frequency around the center frequency f_{rfc} 130 for mixing channels 110 to an intermediate frequency f_{ifc} 160." *Id.*, 2:2-4. The frequency down-mixed channels are then amplified and filtered "to produce a swath of channels 170 centered around frequency f_{ifc} 160." *Id.*, 2:4-6. As shown in FIG. 1, the bandwidth BW1 contains 10 channels which, if they are TV channels, are normally spaced at either 6 MHz or 8 MHz, meaning that

bandwidth BW1 120 would span from 60-80 MHz, and, as a result, the down-converted bandwidth at the intermediate frequency would also require a bandwidth equal to at least BW1. *Id.*, 2:8-13.

360. The '362 Patent observes that when "desired" RF channels are located both in the lower portion of the frequency band (such as VHF in terrestrial TV broadcasting or CATV) and in the higher portion of the frequency band (such as UHF in terrestrial TV broadcasting or channels in CATV's "ultra band"), the total bandwidth BW1 can be 800 MHz or higher. *Id.*, 2:14-20. According to the '362 Patent, this is problematic because the "wide bandwidth of 800 MHz would require a very expensive digital processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator." *Id.*, 2:20-23. It is desirable to have wideband receiver systems that can increase the dynamic range without requiring expensive data conversion, filtering and channel selection at the demodulator.

b. Summary of the Alleged Invention of the '362 Patent

361. The '362 Patent purports to solve the above issues with conventional wideband tuners by disclosing "wideband receiver systems that can increase the dynamic range without requiring expensive data conversion, filtering and channel selection at the demodulator." *Id.*, 2:24-27.

362. The '362 patent allegedly achieves this result via "a wideband receiver system that is configured to concurrently receive multiple radio frequency (RF) channels including a number of desired channels that are located in non-contiguous portions of a frequency spectrum and group the desired channels in a contiguous or substantially-contiguous frequency band at an intermediate frequency spectrum, where the term 'substantially-contiguous' includes spacing the desired channels close to each other (e.g. as a fraction of the total system bandwidth, or relative to a channel bandwidth) but with a spacing that can be variable to accommodate the needs of overall system." *Id.*, 2:31-42.

363. The wideband receiver of the '362 Patent includes:

> a complex mixer module for down-shifting the multiple RF channels and transforming them to an in-phase signal and a quadrature signal in the baseband or low intermediate frequency (IF) band. The system further includes a wideband analog-to-digital converter module that digitizes the in-phase and quadrature signals. The digital in-phase and quadrature signals are provided to a digital frontend module that contains a bank of complex mixers that frequency-shift the number of desired channels to a baseband where the desired channels are individually filtered.

Id., 2:44-55.

364. One embodiment of the '362 Patent's purported invention is shown in FIG. 2, reproduced below:

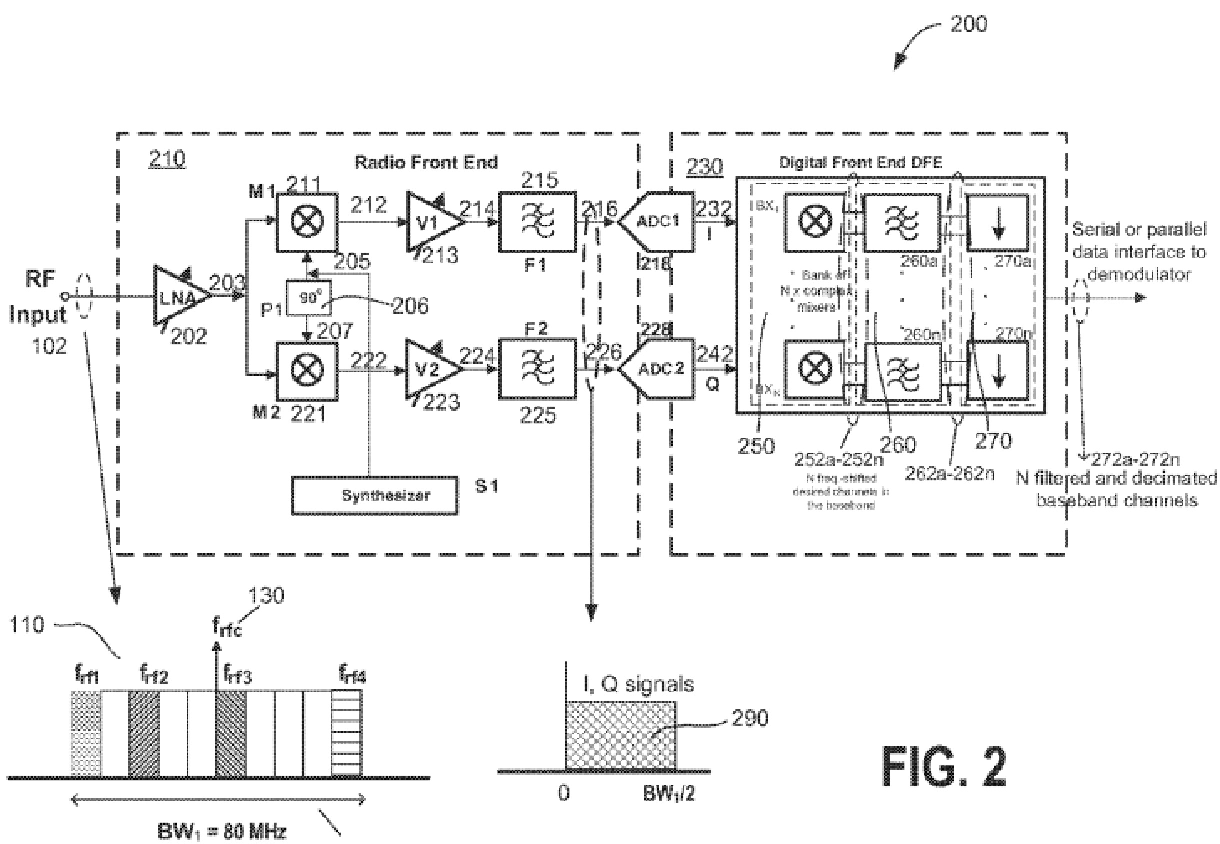


FIG. 2

365. According to the '362 Patent, and as depicted in FIG. 2, "[a]nalog-to-digital converters ADC1 218 and ADC2 228 are high-speed (i.e., high sampling rate) converters to maximize the dynamic range. In an exemplary application, radio front end 210 operates as a

nominal zero-IF down-mixer so that signals 216 and 226 have a nominal bandwidth 290 equal to one half of the RF signal bandwidth BW1 thanks to the complex down-mixer architecture." *Id.*, 5:13-19. According to the '362 Patent, its "approach provides several advantages over conventional tuner architectures. First, it eliminates the need of expensive data conversion, filtering and channel selection on the demodulator side. Second, it removes undesired channels from the signal path at an early stage, thus relieves the large dynamic range requirement in the demodulator." *Id.*, 6:58-64.

c. Prosecution History of the '362 Patent

366. I note that, during prosecution of the application for the '362 Patent, on May 14, 2015, the Examiner issued a non-final rejection of all pending claims (claims 1-20) on the grounds of nonstatutory double patenting over claims 1-27 of U.S. Patent No. 8,526,898 (the "'898 Patent").[17] '362 File History at ENTROPIC_CHARTER_0000639 – 0000643.

367. In response, on May 15, 2015, the Applicant submitted a terminal disclaimer over the '898 Patent. *Id.* at ENTROPIC_CHARTER_0000653 – 0000657.

368. The Examiner issued a Notice of Allowance on August 7, 2015, stating in the Notice that "the prior art made of record teach a wideband receiver system but do not also teach digital circuitry configured to select a plurality of desired television channels from the digitized plurality of frequencies and output said plurality of television channels to a demodulator as a digital datastream." *Id.* at ENTROPIC_CHARTER_0000664 – 0000670.

d. Priority Date / Date of Conception

369. The '362 Patent was filed on February 5, 2015 and is a continuation of U.S. Patent Application No. 13/962,871, filed on August 8, 2013, which, itself, is a continuation of the '898

[17] I note that the '362 Patent is a continuation of the '898 Patent. *See* '362 Patent, Cover (63).

Patent. The ’362 Patent claims the benefit of priority to U.S. Provisional Application 61/170,526, filed April 17, 2009. ’362 Patent, 1:5-11.

370. I have applied the April 17, 2009 date in my analysis of the prior art.

e. Claim Construction

371. I understand that the Court has construed the disputed terms of the ’362Patent as follows:

Term	Court’s Construction
“downconverting … a plurality of frequencies” (Claim 11)	Plain meaning.
Order of Steps (Claim 11)	In Claim 11 of the ’362 Patent, the “digitizing …” step must be performed before the “selecting …” step, and the “selecting …” step must be performed before the “outputting …” step. No other order of steps is required.

372. I have reviewed the Court’s constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the ’362 Patent.

f. Asserted Claims

373. I understand that Entropic accuses Charter of infringing claims 11 and 12 of the ’362 Patent. I discuss below my opinions on the validity of these claims.

g. Invalidity of the 362 Patent Under 35 U.S.C. § § 102 And 103

374. In my opinion, claims 11 and 12 of the ’362 Patent are invalid over U.S. Patent No. 6,704,372 (CHARTER_ENTROPIC00034880 – 00034894) (“Zhang”) alone or Zhang in combination with U.S. Patent No. 7,265,792 (CHARTER_ENTROPIC00035000 – 00035010) (“Favrat”). It is also my opinion that claims 11 and 12 of the ’362 Patent are invalid over U.S.

Patent No. 7,522,901 (CHARTER_ENTROPIC00380676 – 00380681) (“Dauphinee”) alone or Dauphinee in combination with Favrat.

375. Zhang was filed on September 18, 2002 and was published on March 20, 2003. Favrat ws filed on July 1, 2004 and was published on January 5, 2006. Dauphinee was filed on September 29, 2004 and was published on July 21, 2005.

i. Claim 11 Is Invalid In View Of Zhang

376. In my opinion, as discussed further below, claim 11 is invalid in view of Zhang.

1. [11pre]: “A method comprising:”

377. I understand that this limitation is the preamble of claim 11. I have been asked to treat the preamble as a limitation. As such, in my opinion, Zhang discloses it.

378. For example, Zhang disclosure is directed to “[a] ***method*** and circuitry for implementing digital multi-channel demodulation circuits.” Zhang, Abstract. *See also id.*, 1:66-67 (“The present invention provides a method and circuitry for demodulating signals such as downstream signals.”), *id.*, 8:53-54 (“[claim] 20. A method for demultiplexing a digital multi-channel RF signal into a plurality of separate content channels”).

379. Accordingly, in my opinion, this limitation is disclosed or suggested by Zhang.

2. [11a]: “in a wideband receiver system:”

380. In my opinion, Zhang discloses or suggests this feature.

381. The ’362 Patent discloses that its purported invention “relates to wideband receiver systems and methods having a wideband receiver that is capable of receiving multiple radio frequency channels located in a broad radio frequency spectrum.” *Id.*, 1:15-18. Further, the patent describes “wideband” tuners as “tuners designed to concurrently receive several TV channels.” *Id.*, 1:25-27. The ’362 Patent also describes, in its background that a “wide bandwidth of 800 MHz

would require a very expensive digital processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator." *Id.*, 2:20-23.

382. Similarly, Zhang discloses, for example, "a simplified high-level block diagram of an exemplary multi-channel demodulator 600." Zhang, 6:1-6. The described multi-channel demodulator is depicted below in FIG. 6:

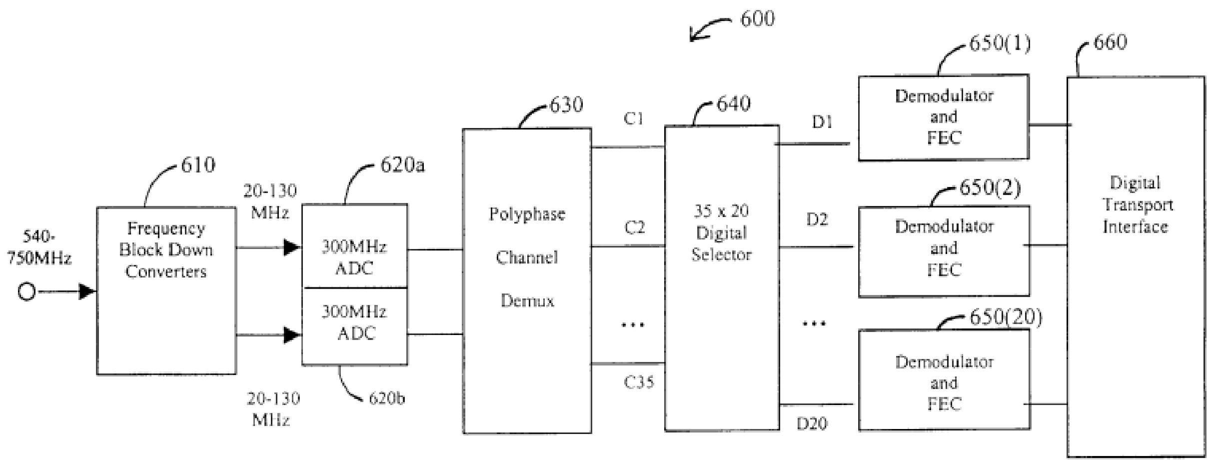


Fig. 6

383. According to Zhang, the received "signal can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems, etc. In this specific embodiment, the signal is sourced by a cable system. Accordingly, the ***multi-channel analog RF signal is shown to be between 540-750 MHz***," *Id.*, 6:7-11. In my opinion, the multi-channel RF signal of between 540 and 750 MHz disclosed in Zhang is a "wideband" signal in accordance the plain meaning of the term in the context of the '362 Patent.

384. In my view, the disclosed demodulator is, or at least can be implemented in, a wideband receiver. For example, Zhang discloses that "[f]or cable services, a wide-band receiver using the invention can incorporate a DOCSIS return channel." *Id.*, 7:4-6.

385. Accordingly, in my opinion, Zhang discloses or suggests this feature.

3. [11a1]: "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies that comprises a plurality of desired television channels and a plurality of undesired television channels;"

386. I understand that the parties disagree on the proper construction of the term "downconverting … a plurality of frequencies." CC Order at 48. I understand that the Court has construed this term as having its "Plain meaning." *Id.* at 52. Regardless, under either parties' position, it is my opinion that Zhang in combination with Favrat discloses or suggests this limitation, or at least render it obvious.

387. For example, Zhang discloses that demodulator 200 depicted in FIG. 2 includes "[a] frequency-block down-converter 210 receives one or more multi-channel analog RF signals which can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems, etc." Zhang, 3:10-14. I have reproduced FIG. 2 of Zhang below:

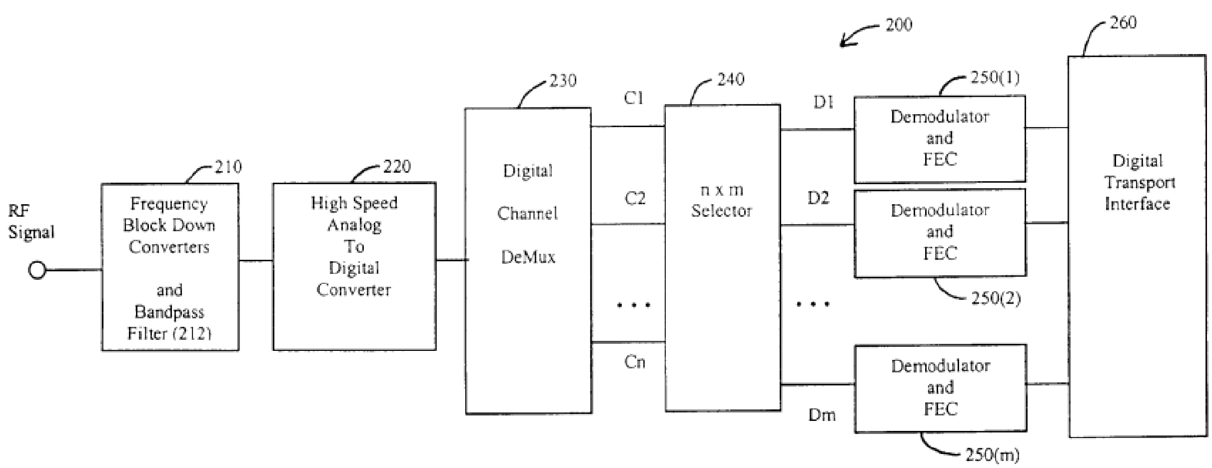


Fig. 2

388. Zhang further discloses that:

> Down converter 210 shifts the multi-channel analog RF signal to a lower frequency band. ***The frequencies are simply downshifted***, i.e., the frequency band of each RF channel and the guard bands remain the same relative to each other, but all are translated down by the same frequency. ***More specifically, the multi-channel analog RF signal is multiplied by a reference signal to a lower frequency band***.

Id., 6:9-17.

389. Zhang discloses that the multi-channel RF signal received by demodulator 200 contains "desired" and "undesired" television channels. For example, Zhang discloses, with respect to selector 240 shown in the figure:

> an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n.*** RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. ***This is because only the selected channels are later demodulated*** unlike the systems using RF tuners which demodulate all of the RF channels

Id., 3:66-4:9. Based on the foregoing, in my opinion, a POSITA would have understood that the RF signal (here described in the digital domain) is comprised of a plurality of frequencies that contain desired RF channels (i.e., the selected channels D_1 to D_m) and undesired channels (i.e., the remainder of the channels in C_1 to C_n that are not selected into the group D_1 to D_m).

390. A POSITA would have understood that the RF channels are television channels. For example, Zhang discloses that the "frequency-block down-converter 210 receives one or more ***multi-channel analog RF signals which can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems,*** etc." *Id.*, 3:10-14.

391. I note that the specification of Zhang does not use the term "mixer" in connection with its frequency block down converters, such as frequency block down converter 210 depicted in FIG. 2. In my view, however, a POSITA would have understood that down converter 210, in the architecture taught by Zhang, would be implemented as a mixer, which was a well-known technique for downconverting RF signals at the time of Zhang, and well before the alleged priority date of the '362 Patent.

392. As I discussed earlier, Zhang discloses that down converter 210 downconverts the frequencies of the RF channel in the received RF signal by multiplying the RF signal "to a lower frequency band." *Id.*, 3:35-37. In my opinion, multiplying an RF signal by a reference signal (local oscillator) is known in the art as "mixing." For example, in an analogous reference, U.S. Patent Application Publication No. 2007/0098089 A1 (CHARTER_ENTROPIC00035923 – 35939) ("Li") discloses a receiver (referred to as a receiver portion 10) which is "adapted to receive incoming signals, for example, radio frequency (RF) signals. As one example, incoming signals may be an RF spectrum, for example, of a direct broadcast system (DBS) or DVB satellite service, satellite radio, or another RF system." Li, [¶ 0023]. As shown in FIG. 1 of Li, after amplification by a low noise amplifier, in-phase and quadrature-phase signals are output to channels A and B, respectively. *Id.*

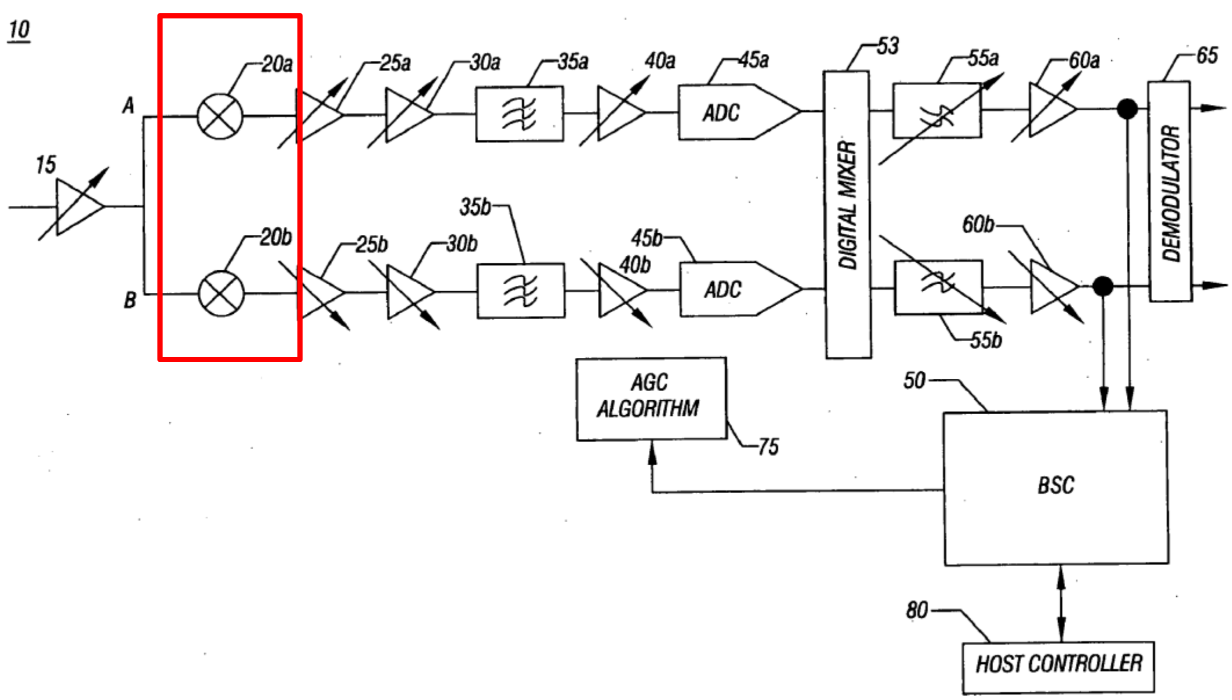


FIG. 1

393. As highlighted in the figure, Li discloses (with respect to in-phase channel A), "the output of LNA 15 is provided to a ***mixer 20 a, which downconverts the incoming RF signals to an intermediate frequency (IF)***." *Id.*, [¶ 0024]. Li goes on to disclose that "it is to be understood that ***mixer 20 a may mix the incoming signals with a received local oscillator (LO) frequency***." *Id.* Li, therefore, confirms my understanding that Zhang's frequency block downconverters are mixers (or mixer modules) within the meaning of the '362 Patent.

394. Accordingly, in my opinion, Zhang discloses or suggests this limitation.

4. [11a2]: "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels;"

395. In my opinion, Zhang discloses or suggests this limitation.

396. Referring back to FIG. 2 of Zhang, reproduced and annotated below, Zhang discloses an ADC (analog-to-digital converter) 220.

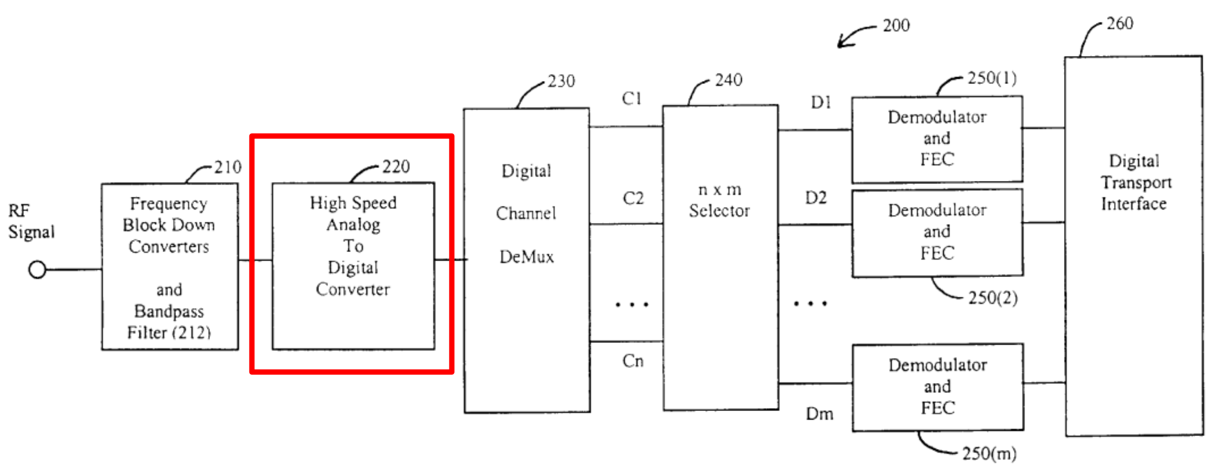


Fig. 2

397. According to Zhang, "ADC 220 then converts the down-converted multi-channel analog RF signal to a multi-channel ***digital*** RF signal. In this specific embodiment, ***ADC 220 is a high-speed ADC so that an entire signal band with n channels can be converted***." Zhang, 3:55-

59. I note that the '362 Patent does not define what a wideband analog-to-digital converter (ADC) module is. However, in my opinion, Zhang's ADC 220, by virtue of it being a "high-speed ADC" having the ability to convert the entire signal band with all n channels, ADC 220 meets the requirement of a "wideband" ADC module.

398. As I discussed in Section XII.g.i.3, the RF signal received by Zhang's demodulator contains both "desired" and "undesired" television channels. As a result, ADC 220 digitizes both the desired and undesired television channels present in the received RF signal.

399. Therefore, in my opinion, Zhang discloses or suggests this limitation.

5. [11a3]: "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies; and"

400. In my opinion, Zhang discloses or suggests this limitation.

401. For example, as highlighted below in annotated FIG. 2, Zhang discloses both a digital channel demultiplexer and what Zhang refers to as an nxm digital selector.

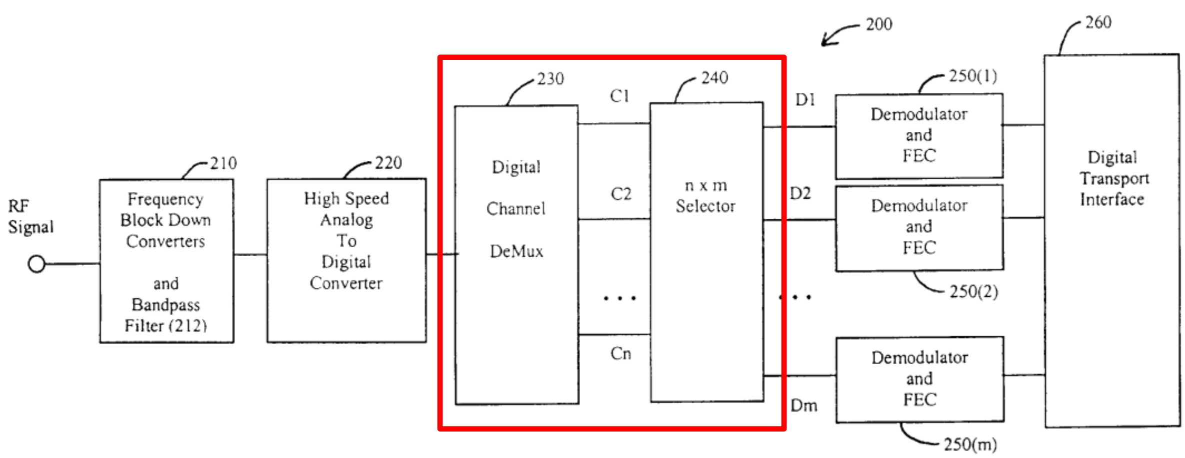


Fig. 2

402. According to Zhang:

A ***digital channel demultiplexer 230*** then ***demultiplexes the multi-channel digital RF signal into separate digital RF channels*** C_1 to C_n. The specific implementation of channel demultiplexer 230 will depend on the specific application and

> requirements. Alternative channel demultiplexer embodiments are described in more detail below (FIGS. 2 and 3). Still referring to FIG. 2, ***an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***. RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. This is because o***nly the selected channels are later demodulated unlike the systems using RF tuners which demodulate all of the RF channels***.

Id., 3:60-4:9. The '362 Patent does not define the term "digital circuitry." In my opinion, however, Zhang's digital channel demultiplexer 230 and digital selector 240 are each "digital circuitry."

403. Zhang, for example, discloses a "digital tuner 300," which can be used to implement digital channel demultiplexer 230. *Id.*, 4:33-36. Zhang goes on to refer to digital tuner 300 as "[d]igital tuner ***circuit*** 300," which "outputs the separated RF channels C_1 to Cn, each RF channel being centered at baseband." *Id.*, 4:65-67.

404. Zhang discloses another embodiment of digital channel demultiplexer 230, which, in this case, is a "polyphase channel demultiplexer 400." *Id.*, 5:1-2. Zhang goes on to discloses that "[p]olyphase channel demultiplexer 400 includes a bank of low-pass filters (LPFs) 410(1 . . . n) and a ***discrete Fourier transform circuit*** (DFT) 420." *Id.*, 5:5-7.

405. With respect to digital selector 240, in my opinion, Zhang confirms (aside from its name) that it is implemented using digital circuitry. Indeed, Zhang contrasts digital selector 240 with "traditional" analog circuitry. *See, e.g., id.*, 4:4-6 ("Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners.").

406. As demonstrated by the above quoted passage, Zhang discloses that digital channel demultiplexer 230 and digital selector 240 select desired television channels from a multi-channel digital RF signal. Zhang discloses:

> Still referring to FIG. 2, an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***. RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. ***This is because only the selected channels are later demodulated unlike the systems using RF tuners which demodulate all of the RF channels***.

Id., 3:66-4:9.

407. Therefore, in my opinion, Zhang discloses or suggests this limitation.

6. [11a4]: "outputting, by said digital circuitry of said wideband receiver system, said selected plurality of television channels to a demodulator as a digital datastream."

408. In my opinion, Zhang discloses or suggests this feature.

409. For example, still referring to FIG. 2, Zhang discloses:

> ***The m selected RF channels are then fed into respective demodulators 250(1), 250(2), . . . 250(m)***. The architecture of demodulator 200 enables it to handle multi-channel satellite, terrestrial TV (NTSC, ATSC, DVB-T, etc), and cable downstream signals. In some embodiments ***demodulators 250(1 . . . m) are shared demodulators because they share resources. Many functional blocks can be shared between different demodulators***. Such functional blocks, for example, can include numeric controlled oscillators (NCOs), timing error detection circuitry, carrier recover circuitry, etc. Because of the resource sharing between such demodulators, significant power saving is achieved. Hence, with such embodiments of the present invention, more RF channels can be demodulated in a single chip.

Id., 4:13-26.

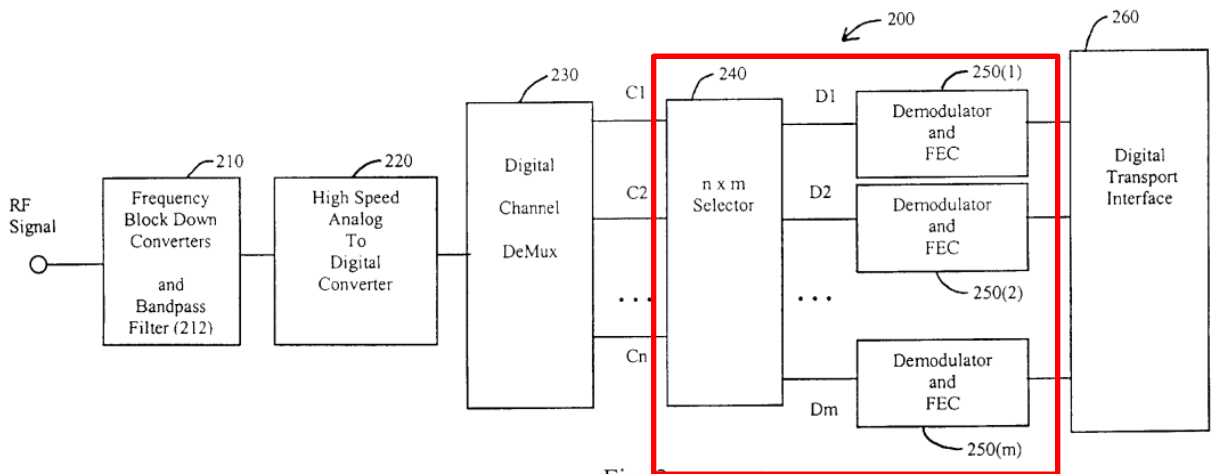


Fig. 2

410. Thus, as disclosed, the selected channels are output from digital selector 240 to a corresponding demodulator 250. Each of the selected RF channels D_1 to D_m is a digital datastream. For example, with respect to the RF channels received by Zhang's demodulators are "data streams":

> A given RF channel carries one or more "content" channels, which are ***data streams*** that are superimposed on that channel's carrier frequency and intended to be accessed or used by subscribers. As used here, one RF channel can carry one or more content channels. Accordingly, ***one RF channel can provide a variety of data streams***, some of which are selected by a subscriber, e.g., audio, video, etc. Other data streams might be pre-programmed or selected by a program provider, e.g., conditional access data, etc.

Id., 3:20-30. In addition, Zhang discloses that the RF channels selected by digital selector 240 are ***digital***. See *id.*, ("digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***."). It is also my opinion that, not only are the individual selected digital RF channels, themselves, digital datastreams, but also that a POSITA would have understood that the collection of all m selected RF channels (i.e., the collection of channels D_1 to D_m) comprise a digital datastream within the meaning of the '362 Patent.

411. To the extent that the claim is found to require a single demodulator,[18] rather than "respective demodulators 250(1), 250(2), . . . 250(m)" (*id.*, 4:13-14) that are disclosed in the embodiment of FIG. 2, Zhang nonetheless discloses or suggests this. For example, with respect to the demodulators 250, Zhang discloses:

> In some embodiments ***demodulators 250(1 . . . m) are shared demodulators because they share resources. Many functional blocks can be shared between different demodulators***. Such functional blocks, for example, can include numeric controlled oscillators (NCOs), timing error detection circuitry, carrier recover circuitry, etc. Because of the resource sharing between such demodulators, significant power saving is achieved. Hence, with such embodiments of the present invention, more RF channels can be demodulated in a single chip.

Id., 4:17-25. Therefore, in my view, a POSITA would have recognized that demodulators 250(1 … m) could be implemented as either separate demodulators on different chips, or as an integrated, single-chip demodulator.

Therefore, it is my opinion that Zhang discloses or suggests this limitation.

ii. Claim 12 Is Invalid In View Of Zhang In Combination with Favrat

1. [12]: "The method of claim 11, comprising outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface."

412. In my opinion, Zhang in combination with Favrat would have rendered this claim obvious.

413. As I discussed in Section XII.g.i.6, Zhang discloses that the digital RF channels selected by digital selector 240 are fed into respective demodulators 250(1), 250(2), …, 250(m), which, according to Zhang, can be a single, shared demodulator. Zhang, however, does not

[18] I have been informed that the recitation of an indefinite article, such as "a" or "an," in a patent claim carries the meaning of "one or more."

expressly disclose that the selected RF channels are provided to the demodulators via a serial interface are converted to a digital data stream to be sent to a demodulator.

414. It is important to note that the ’362 Patent acknowledges that outputting selected (or “desired”) channels using a serial data interface was already known in the art. *See, e.g.*, ’362 Patent, 6:55-58 (“The reduced sampling rate of the N desired baseband channels will be sent as a serial or parallel digital data stream to a demodulator ***using a serial or parallel data interface according to commonly known methods***”). I agree with the ’362 Patent’s admission. I point to Favrat, as an exemplary reference that expressly discloses the commonly known features recited in claim 12.

415. Favrat, in field similar to Zhang, is directed to “a dual-format television (TV) receiver for receiving analog and digital TV signals uses a single signal processing circuit for processing the received input RF television signal.” Favrat, 3:9-12. Favrat’s receiver includes “a frequency conversion circuit (a tuner), a digitizing IF circuit, a digital signal processor (DSP) circuit and a signal output circuit.” *Id.*, 3-20-22. According to Favrat, “the signal output circuit receives the digital output signals from the signal processor and provides one or more output signals corresponding to the digital output signals.” *Id.*, 2:42-45.

416. FIG. 1, reproduced below, depicts Favrat’s receiver, which includes a frequency conversion circuit 110, a digitizing IF circuit 120, a digital signal processor (DSP) circuit 130, and a signal output circuit 140:

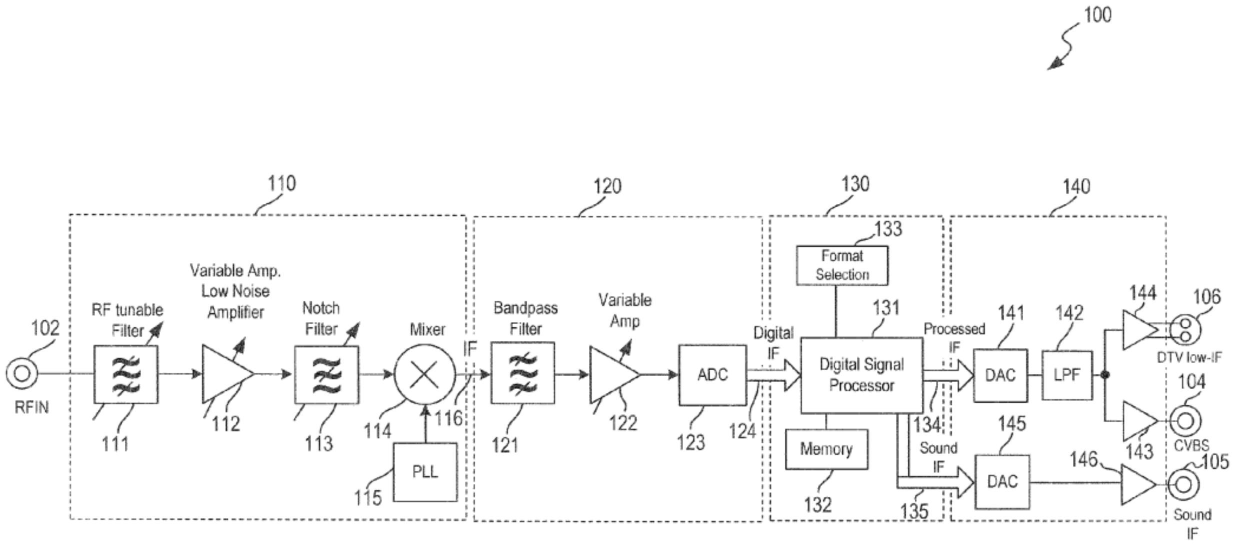


Fig. 1

Id., 4:49-7:33 (description of the embodiment of FIG. 1).

417. According to Favrat, "[t]he input RF signals can be received from terrestrial broadcast or cable transmissions. Frequency conversion circuit 110 operates to convert the input RF signal to an intermediate frequency (IF) signal using one or more frequency conversions." *Id.*, 4:53-58. Next, as shown, the IF signal is provided to digitizing IF circuit 120. As Favrat discloses:

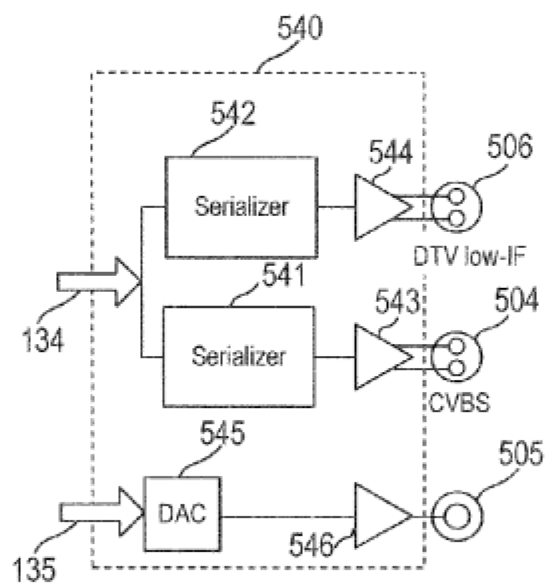
> Digitizing IF circuit 120 includes a bandpass filter 121, a variable gain amplifier 122 and an analog-to-digital converter (ADC) 123. The IF signal is filtered by bandpass filter 121. Then, amplifier 122 operates on the filtered IF signal for the purpose of regulating the dynamic range of ADC 123. ADC 123 operates to digitize the analog IF signal and provide a digital IF signal on a terminal 124.

Id., 5:16-23.

418. Next, "[a]fter the IF signal is filtered and digitized, the digital representation of the signal is processed by a digital signal processor (DSP) 131 in DSP circuit 130." *Id.*, 5:48-50. DSP 131, in turn, "generates a processed IF signal on terminal 134 as the video baseband signal and a processed IF signal on terminal 135 as the audio baseband (or sound IF) signal." *Id.*, 6:33-36.

419. Next, "[t]he processed IF signals on terminals 134 and 135 are coupled to signal output circuit 140 to be converted into the desired output signals." *Id.*, 6:49-51. Although the signal output circuit in FIG. 1 converts the digital IF signals to analog (via DACs 141 and 145), Favrat depicts other embodiments of its signal output circuit, which I discuss below.

420. For example, in an alternative embodiment to the signal output circuit 140 depicted in FIG. 1, Favrat discloses a signal output circuit 540, which I have excerpted from FIG. 2 and reproduced below:



Id., FIG. 2 (excerpt).

421. As shown, "a signal output circuit 540 includes a ***first serializer 541*** and a ***second serializer 542*** so that the video signals from the signal output circuit are provided as ***serial digital interfaces***." *Id.*, 8:3-6. Further, as shown in the figure, serializer 541 and serializer 542 both receive processed digital IF video signal 134. According to Favrat, "[s]erializer 542 and driver 544 form a parallel data path providing a serial digital data stream on an output terminal 506." *Id.*, 8:10-12. As Favrat discloses, "[t]he ***serial digital data on output terminal 506 can be coupled to***

a digital demodulator and a decoder ***for demodulating*** and decoding the ***digital television signals***." *Id.*, 8:17-19. In my opinion, a POSITA would have understood that Favrat's coupling of serializer 542 to a digital demodulator via output terminal 506 is a "serial interface."

422. In my opinion, a POSITA would have been motivated to implement Favrat's serial interface in Zhang's digital multi-channel demodulator with a reasonable expectation of success. For example, Zhang notes that undue power consumption is a concern with traditional prior art multi-channel cable and satellite demodulators. *See* Zhang, 1:60-63. One source of this power consumption is Zhang's demodulator, which Zhang addresses by implementing its demodulators so that they share resources. *See id.*, 4:13-19. In my opinion, implementing Favrat's technique of serializing selected RF channels and outputting those selected RF channels to a digital demodulator would further Zhang's interest in reducing power consumption as doing so would reduce the number of buses needed between selector 240 and demodulators 250 shown in FIG. 2. Indeed, this reduction in the number of buses between the selector and a demodulator bank is suggested in the embodiment shown in FIG. 7 of Zhang, which I have reproduced below:

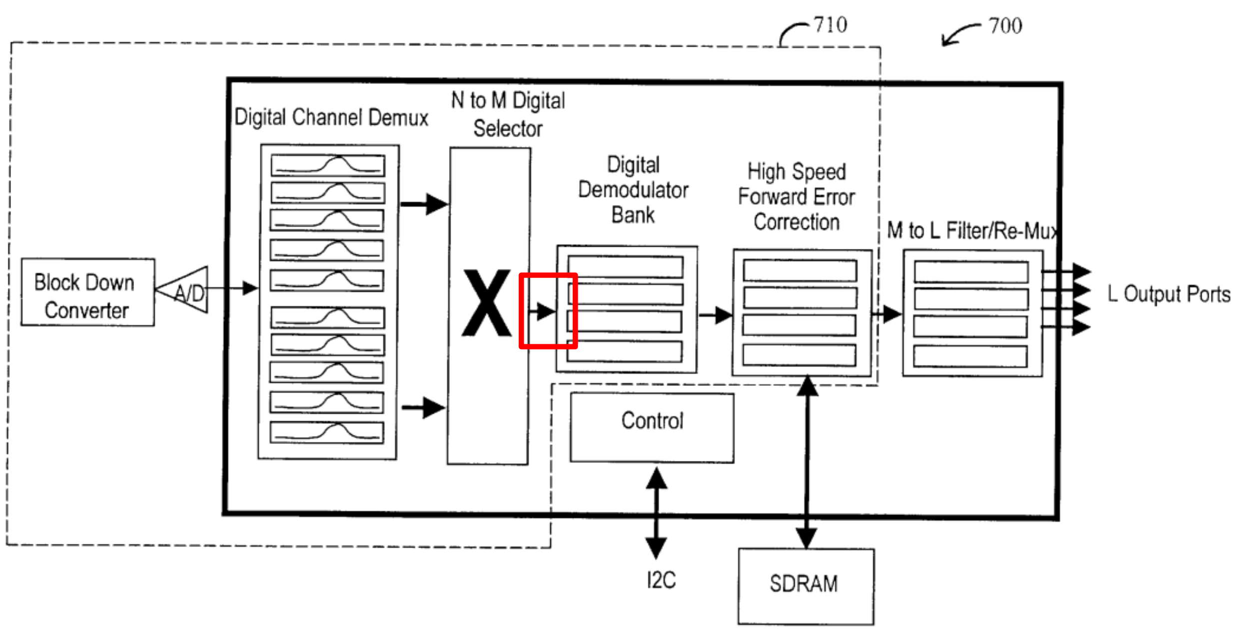


Fig. 7

423. As shown, in my view, it would have been obvious to implement the highlighted connection between the N to M Digital Selector and the Digital Demodulator Bank using the well-known serialization techniques disclosed in Favrat. Doing so, in my opinion, would have involved nothing more than applying Favrat's known serialization technique to a Zhang's known multi-channel demodulator to yield predictable results, namely, an improved multi-channel demodulator that achieves an additional reduction in power consumption.

424. Therefore, Zhang in combination with Favrat would have rendered this claim obvious.

iii. Claim 11 Is Invalid In View Of Dauphinee

425. In my opinion, as discussed further below, claim 11 is invalid in view of Dauphinee.

1. [11pre]: "A method comprising:"

426. As I discussed above, I understand that this limitation is the preamble of claim 11. I have been asked to treat the preamble as a limitation. As such, in my opinion, Dauphinee discloses it.

427. For example, Dauphinee discloses "improved methods and systems for tuning." Dauphinee, 1:26-27. *See also id.*, 7:5-6 ("[Claim] 15. A method for tuning an RF signal having multiple channels using a direct sampling tuner, comprising …").

428. Accordingly, in my opinion, Dauphinee discloses this limitation.

2. [11a]: "in a wideband receiver system:"

429. In my opinion, Dauphinee discloses or suggests this feature.

430. For example, Dauphinee discloses "a tuner 100, according to one embodiment of the present invention. Tuner 100 includes a direct sampling analog-to-digital converter ("ADC") 106. The ADC 106 samples a signal 116 at a Nyquist frequency (i.e., greater than twice the frequency of the signal 116). As a result, image problems associated with conventional tuners are

substantially eliminated." *Id.*, 3:2-9. Dauphine discloses that its tuner and ADC are adapted to digitize greater than wideband frequency ranges. For example, Dauphine discloses "in a cable channel environment, where the highest frequency is typically around 860 MHz, the ADC 106 is operated at greater than 1720 MHz. Also, for example, in a satellite environment, where the frequency is about 2150 MHz, the ADC 106 is operated at greater than 4300 MHz." *Id.*, 3:44-48.

431. I have reviewed Entropic's infringement contentions with respect to this feature. Entropic maintains that "Full-band Capture digital tuning technology," consisting of "on-chip technology [that] directly samples and digitizes the entire 1GHz downstream spectrum of a cable plant" meets this claim limitation. Entropic's First Suppl. Infringement Contentions, Ex. D, at 5. As a POSITA would understand that a 1GHz downstream spectrum is a "wideband" signal, Dauphinee discloses a tuner that receives such a signal.

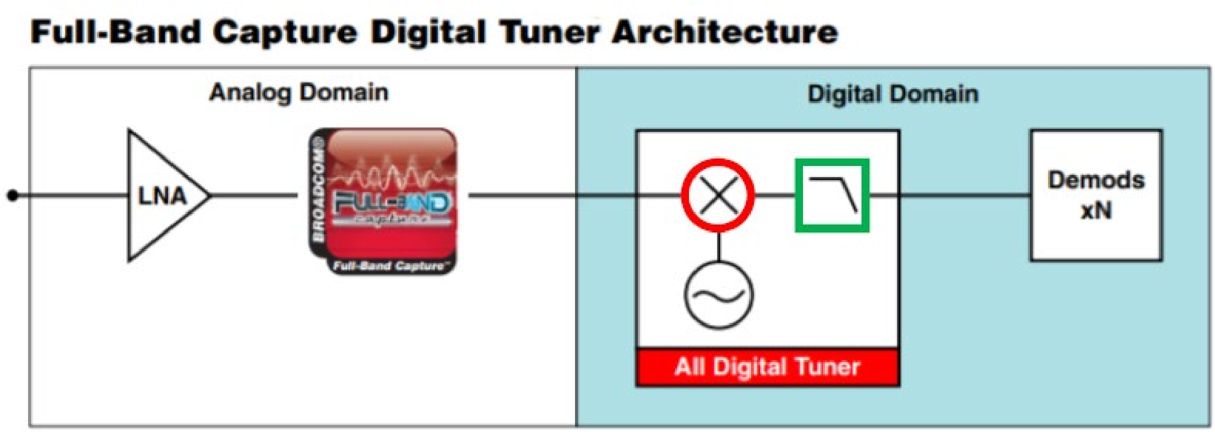
432. Therefore, in my opinion, Dauphinee discloses or suggests this limitation.

3. [11a1]: "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies that comprises a plurality of desired television channels and a plurality of undesired television channels;"

433. In my opinion, Dauphinee discloses or suggests this limitation.

434. I understand that, during claim construction, Charter maintained that the term "downconverting … a plurality of frequencies" should be construed such that the downconverted signal is an analog radio frequency (RF) signal. CC Order at 48. Charter maintained that the order of the steps of claim 11 must be performed in the order recited in the claim. *Id.* Based on my review of the specification of the '362 Patent, the grammar of claim 11, and the declarations of both Dr. Almeroth on behalf Charter's claim constructions and Dr. Kramer on behalf of Entropic's claim constructions, I agree with Charter's proposed construction.

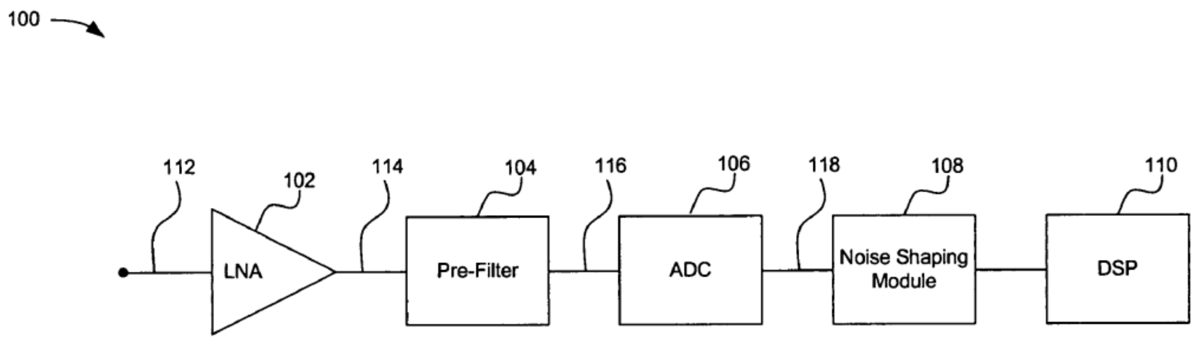
435. I understand that the Court construed the "downconverting" limitation as having its "Plain meaning." *Id.* at 52. I also understand that the Court construed the order of the steps of claim 11 as requiring the "digitizing …" step to be performed before the "selecting …" step, and the "selecting … "step to be performed before the "outputting …" step, while no other order of steps is required. *Id.* I also understand that Entropic maintains that this limitation is met when digital channels, some of which are desired and some of which are undesired, are "frequency shift[ed] (i.e., downconvert[ed]) … from a higher frequency to a lower frequency (i.e., a baseband frequency)." Entropic's First Suppl. Infringement Contentions, Ex. D, at 6. Entropic alleges that a "mixer module" that operates in the digital domain meets this limitation as well.



436. While I disagree that the "downconverting …" step of claim 11 is performed on a digital, rather than an analog signal, assuming, for the sake of argument, that the "plurality of frequencies" in this limitation can already have been digitized, then, in my opinion, Dauphinee discloses or suggests this limitation.

437. For example, Dauphinee discloses that "[a] problem in direct conversion tuners is harmonic mixing where harmonics of the local oscillator frequency mix undesired channels to a baseband on top of the ***channel of interest***." A POSITA would understand this channel of interest to be the same channel of interest, "plurality of desired television channels and a plurality of

undesired television channels." Thus, in my opinion, Dauphinee discloses that, whether using "conventional" direct conversion tuners, or Dauphinee's exemplary direct sampling tuner, which I have reproduced below, the tuner receives a signal (i.e., a plurality of frequencies) that consists of both desired and undesired television channels.



438. Therefore, in my opinion, Dauphinee discloses or suggests this limitation.

4. [11a2]: "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels;"

439. For example, Dauphines discloses a high-speed, high-resolution ADC. Specifically, Dauphinee discloses:

> In one example, t***he direct sampling ADC 106 is a high speed, high resolution ADC that effectively samples the entire spectrum of the signal 116 at the Nyquist rate.*** For example, in a cable channel environment, where the highest frequency is typically around 860 MHz, the ADC 106 is operated at greater than 1720 MHz.

Id. 3:41-46.

440. Therefore, in my opinion, Dauphinee discloses or suggests this limitation.

5. [11a3]: "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies; and"

441. In my opinion, Dauphinee discloses or suggests this limitation.

442. For example, Dauphinee discloses that "[i]n one example, the tuner 100 further includes a ***digital signal processor ("DSP") 110***. In one example, an entire band received at the ADC 106 is digitized so that ***multiple or desired channels of the band can be demodulated using the DSP 110***." *Id.*, 3:20-24. Dauphinee discloses that a "pre-filter 104 … provides the selected band of interest, or sub-set of channels, to the ADC 106, which directly samples the selected band of interest. ***The samples are then processed by the DSP 110 to decode information from one or more selected channels***." *Id.*, 5:18-22. In addition, Dauphinee discloses that "the DSP 110 can perform one or more of: ***channel filtering***, equalization, demodulation, decimation, and/or gain control." *Id.*, 5:49-51.

443. Thus, in my opinion, a POSITA would have understood that Dauphinee's digital signal processor (DSP) 110 consists of "digital circuitry"[19] that selects desired channels from a digitized plurality of frequencies. As discussed above, DSP 110 is configured to demodulate "multiple or desired" channels of an entire band of frequencies. As I have also discussed above, Dauphinee discloses that DSP 100 is, in some embodiments, configured to perform channel filtering. In my opinion, a POSITA would have understood that a digital signal processor that is able to demodulate desired channels of an entire band of frequencies must necessarily "select" those channels. A POSITA would also have understood that channel filtering also discloses, or at the very least suggest, the "selection" of certain desired channels, while filtering out undesired channels.

444. Therefore, it is my opinion that Dauphinee discloses or suggests this limitation.

[19] *See* Dauphinee, 6:5-9 ("One skilled in the art will recognize that these functional building blocks can be implemented by discrete components, application specific ***integrated circuits,*** processors executing appropriate software and the like and combinations thereof.").

6. [11a4]: "outputting, by said digital circuitry of said wideband receiver system, said selected plurality of television channels to a demodulator as a digital datastream."

445. It is my opinion that Dauphinee discloses or suggests this limitation.

446. For example, as discussed above, Dauphinee discloses a digital signal processor (DSP) that performs demodulation. As Dauphinee teaches "a front end of the direct sampling tuner includes a low noise amplifier ("LNA"). In this example, an entire band is digitized so that the ***multiple channels can be demodulated using a digital signal processor ("DSP")***." *Id.*, 1:40-43. *See also id.*, 5:49-51 ("the DSP 110 can perform one or more of: channel filtering, equalization, demodulation, decimation, and/or gain control.").

447. In my opinion, Dauphinee's DSP 110 meets this limitation. DSP 110, as described by Dauphinee performs a number of different functions, such as channel filtering (i.e., selection) and demodulation. Therefore, in my view, a POSITA would have understood that Dauphinee discloses, or at the very least suggests, that DSP 110, after filtering through desired channels (i.e., selecting those desired channels) using its channel filtering function, then "outputs" those selected channels to DSP 110's demodulator.

448. A POSITA would also have understood that the channels output to DSP 110's demodulator comprises a "digital datastream." For example, Dauphinee discloses that "[i]n one example, the ADC 106 is a ***multi-bit ADC***. In a cable channel environment the ADC 106 can be, for example, a 10 bit ADC, that can yield ENOB (effective number of bits) of 8 bits. ENOB is the measured performance (in bits) of the ADC 106 with respect to input frequency f_{IN}." *Id.*, 3:53-57.

449. Therefore, in my opinion, Dauphinee discloses or suggests this limitation.

iv. Claim 12 Is Invalid In View Of Dauphinee In Combination with Favrat

1. [12]: "The method of claim 11, comprising outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface."

450. In my opinion, Dauphinee in combination with Favrat would have rendered this claim obvious.

451. I note that Dauphinee does not expressly disclose that DSP 110 outputs selected desired channels to its demodulator via a serial interface. Indeed, Dauphinee leaves certain details of his invention up to the implementer. Dauphinee acknowledges this:

> The present invention has been described above with the aid of functional building blocks illustrating the performance of specified functions and relationships thereof. The boundaries of these functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternate boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Any such alternate boundaries are thus within the scope and spirit of the claimed invention. One skilled in the art will recognize that these functional building blocks can be implemented by discrete components, application specific integrated circuits, processors executing appropriate software and the like and combinations thereof.

Id., 5:64-6:9.

452. Among the details that Dauphinee leaves as an implementation choice is the type of data paths that connect the components of tuner 100 (including DSP 110), as well as the type of data paths within those components. In my opinion, a POSITA would have found that implementing these data paths as serial data paths would have been an obvious, and reasonable, choice.

453. My opinion is informed by the example disclosed in Favrat. As I discussed above, Favrat discloses, with respect to FIG. 2, a serializer 542 that provides a serial digital data stream on an output terminal 506. This serial digital data can, according to Favrat, be coupled to a digital demodulator and a decoder for demodulating and decoding digital television signals. *See id.*, 8:10-

19. As the ’362 Patent, implementing the transmission of a data stream to a demodulator using either a serial or parallel interface was commonly known. As such, in my opinion, a POSITA would have looked to references that are in the same field as Dauphinee (such as Favrat) in order to fill in any specific implementation details that Dauphinee open.

454. Therefore, in my opinion, a POSITA would have been motivated to apply the teachings of Favrat to the Dauphinee in order to realize a tuner (including a DSP) having a serial interface, whereby the channels selected by the DSP are outputted to the DSP’s demodulator using the serial interface. Further, in my view, a POSITA would have had a reasonable expectation in success in doing so because this would have involved nothing more than applying Favrat’s known technique of outputting digital signals via a serial interface to Dauphinee’s known device, which leaves the type of output path open as a design choice, to obtain a predictable result.

455. Therefore, it is my opinion that Dauphinee in combination with Favrat would have rendered this claim obvious.

h. Subject Matter Eligibility

456. I have been asked to provide my opinions on the subject matter eligibility of the asserted claims of the ’362 Patent. In my opinion, the claims are directed to unpatentable subject matter, namely, an abstract idea. Further, in my opinion, the claims do not recite an inventive concept that would be sufficient to transform the claims into a patent-eligible application of the abstract idea. I provide my opinions below with respect to claim 11 as being representative of all of the claims being asserted by Entropic. It is my opinion that claim 12 is directed to the same abstract idea as claim 11 and fails to add any inventive concept that is sufficient to transform the claim into a patent-eligible application of the abstract idea.

457. In my view, the asserted claims of the ’362 Patent are directed to unpatentable subject matter, namely, they recite nothing more than the abstract idea of processing and digitizing a received television signal and outputting channels of the digitized signal.

458. I base my opinion on my analysis of each limitation of claim 11. At bottom, claim 11 recites:

> ***downconverting***, by a mixer module of said wideband receiver system, a ***plurality of frequencies that comprises a plurality of desired television channels and a plurality of undesired television channels***;
>
> ***digitizing***, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, ***said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels***;
>
> ***selecting***, by digital circuitry of said wideband receiver system, ***said plurality of desired television channels from said digitized plurality of frequencies***; and
>
> ***outputting***, by said digital circuitry of said wideband receiver system, ***said selected plurality of television channels*** to a demodulator as a digital datastream.

459. “Downconverting” is a conventional step for taking a signal,, which is transmitted at a certain frequency, and “shifting” that signal to a lower (or intermediate) frequency, while still preserving the same information within the signal. To be clear, downconversion of a signal, at the time of and well before the purported priority date of the ’362 Patent, was a technique that was well known in the art, and, by that time, not at all inventive. My review of the ’362 Patent confirms this, as the patent states, in its discussion of the background art:

> Receivers used to down-convert and selectively filter TV channels are referred to as tuners, and tuners designed to concurrently receive several TV channels are referred to as wideband tuners. Existing tuners for these applications down-convert a swath of channels to an intermediate frequency, which are then sent to a demodulator.

’362 Patent, 1:24-29. I note that the claim does not recite any particular way “downconversion” is achieved—the claimed step is purely functional, lacking any details, and, in my opinion, simply recites the abstract concept of receiving and processing a signal.

460. The remaining steps of claim 11 are similarly functional, lacking in any detail, and, in my opinion, abstract. Indeed, the remaining steps further track the abstract idea that the claim recites. As shown, these limitations, at bottom, simply recite "digitizing" the signal, "selecting" certain channels from the digitized signal, and simply "outputting" those selected channels. These limitations, like the downconverting limitation, do not recite anything more than these abstract concepts of digitizing, selecting, and outputting.

461. It is therefore my opinion that claims 11 and 12 are directed to the abstract idea of processing and digitizing a received television signal and outputting channels of the digitized signal.

462. Next, I analyzed the claims to see what, if anything, the claims recite that may transform the abstract idea of processing and digitizing a received television signal and outputting channels of the digitized signal into a patent-eligible application of that abstract idea. I understand that this implicates an "inventive concept." In my opinion, the claims fail to recite any such inventive concept.

463. Beyond the abstract steps of "downconverting," "digitizing," "selecting," and "outputting" the claims recite nothing more than what any POSITA in the field would understand as being well-understood, routine, and conventional steps performed by well-understood, routine and conventional components.

464. For example, the "downconverting" step recites that it is performed by a "mixer module." The claim, however, provides no details of how such a mixer module is constructed or is in any way inventive. Indeed, the '362 Patent itself concedes that mixers were well known and conventional devices for performing downconverting:

> FIG. 1 shows a ***conventional wideband tuner 100***. Tuner 100 may be a direct conversion tuner and includes a low noise amplifier LNA1 having an input terminal

> coupled to a radio frequency (RF) input signal 102 and an output terminal coupled to a mixer M1 … ***Mixer M1 frequency down-converts the received RF input signal to a more convenient intermediate frequency (IF) band.***

Id., 1:46-62.

465. The "digitizing" recites a "wideband analog-to-digital converter," which, in my opinion, were also well known in the art at the time of the '362 Patent. Indeed, a stated purpose of the '362 Patent is the ability to use these conventional analog-to-digital converters without requiring, as the patent puts it, "very expensive digital processing circuitry such as very high-speed analog to digital conversion." *Id.*, 2:21-22.

466. The "selecting" and "outputting" steps are performed by unspecified "digital circuitry," reflecting a lack of an inventive concept, since "digital circuitry" has been known in the art well before the purported invention of the '362 Patent. Further, the '362 Patent concedes, in its background, that receivers that "selectively filter TV channels" were known in the art as "wideband tuners." *Id.*, 1:24-27. Tuning in the digital domain was also well known in the art before the '362 Patent. For example, as I discussed above, Zhang discloses a digital tuner and digital selector that demultiplexes a multichannel digital signal and selects one or more digital channels for demodulation. Zhang at 3:60-4:12. The '362 Patent also concedes that conventional tuners outputted signals to a demodulator. '362 Patent, 1:62-64. In my view, there is also nothing inventive about outputting digital signals to a demodulator. The conventionality of providing digital data to a demodulator is another fact conceded by the '362 Patent. *See id.*, 6:55-58 ("The reduced sampling rate of the N desired baseband channels will be ***sent as a serial or parallel digital data stream to a demodulator*** using a serial or parallel data interface ***according to commonly known methods***").

467. Claim 12, in my opinion, does not add an inventive concept to the recited abstract idea of claim 11. Claim 12 simply requires that the digital datastream be outputted via a serial

interface. This, however, was a "commonly known" technique, as the '362 Patent concedes, and as I just discussed.

468. Simply put, nothing in claims 11 or 12 supplies in inventive concept to transform the claims into a patent-eligible application of the abstract idea of processing and digitizing a received television signal and outputting channels of the digitized signal.

469. As a result, in my opinion, the asserted claims of the '362 Patent do not recite anything more than an abstract idea implemented by conventional components and functions. To the extent Entropic provides additional information regarding the claims of the '362 Patent at a later date, I reserve the right to amend my opinions in response.

i. Invalidity Under 35 U.S.C. § 112

i. "downconverting … a plurality of frequencies" and Order of Steps in Claim 11

470. I understand that the Court has construed the term "downconverting … a plurality of frequencies" as "plain meaning," and has construed "Order of Step in Claim 11 of the '362 Patent as "In Claim 11 of the '362 Patent, the 'digitizing …' step must be performed before the 'selecting …' step, and the 'selecting …' step must be performed before the 'outputting …' step. No other order of steps is required." CC Order at 52.

471. I understand the the scope of the claim is broad enough to cover performing the downconverting step after the digiting step, such that the digitizing step could be the first step of the claim that is performed. It is my opinion that claim 11, as so construed, lacks written description support and is not enabled by the specification. Indeed, this scope voids the alleged invention of the patent entirely.

472. As I discussed above, a stated goal of the '362 Patent is to downconvert the "wide bandwidth" of the received signal which would otherwise "require a very expensive digital

processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator." '362 Patent, 2:20-23.

473. FIG. 2 of the patent depicts an exemplary receiver system in accordance with the claimed invention. All of the disclosed embodiments contain these basic components:

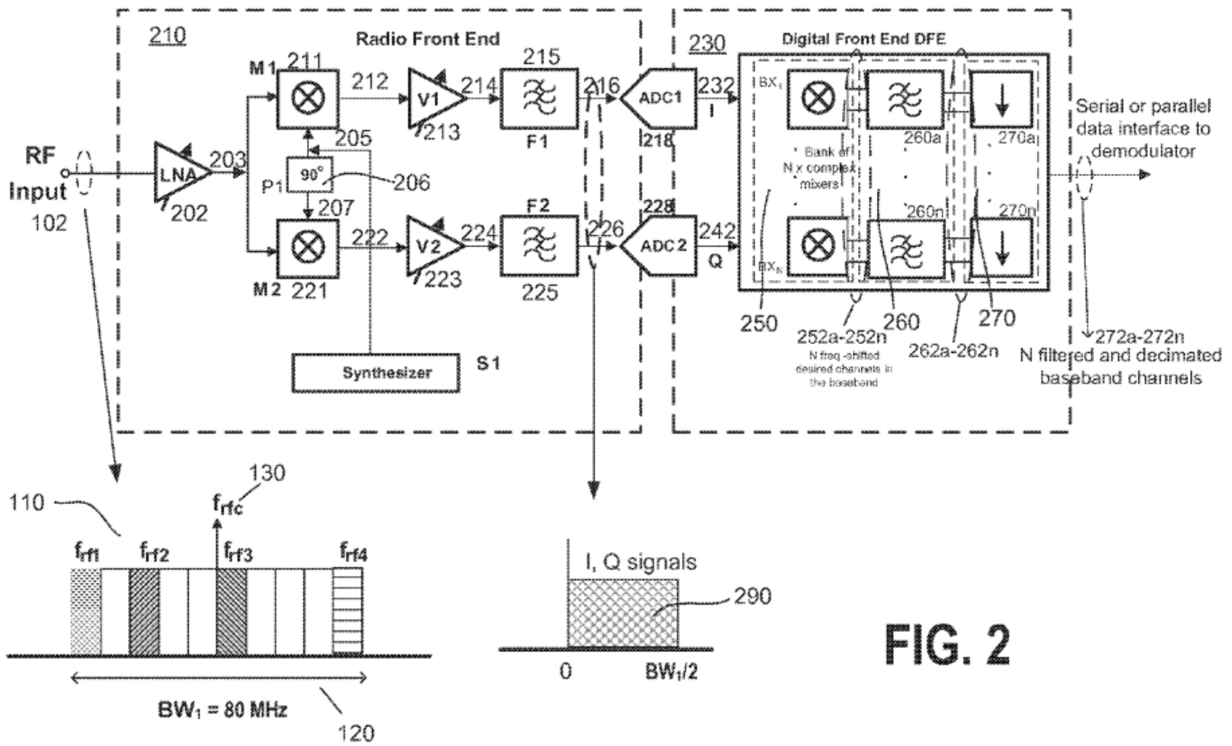


FIG. 2

474. The incoming signal is received into the "radio front end" on the left, and is described as the "RF Input" or "RF signal." '362 Patent, 1:48-50; 4:27-28. "RF" means it is an analog signal.

475. The radio front end is said to, in some way, capture a "swath" of channels from the RF signal that includes the "desired" channels (channels the customer is interested in) and undesired channels (1:27-31). That swath has a bandwidth designated BW_1. *Id.* 1:67-2:2, 4:19-22, Fig. 2. BW_1 can be as wide as "800 MHz or higher," which would require the expensive analog to digital converters. *Id.* 2:20-23. That is the bandwidth that must be reduced.

476. The analog swath having bandwidth BW_1 is provided as input to mixers 211 and 221. (*Id.* 4:37-39.) Together, these mixers constitute a "complex mixer module for down-shifting the multiple RF channels and transforming them to an in-phase signal and a quadrature signal in the baseband or low intermediate frequency (IF) band." (*Id.* 2:45-49, 4:40-53.) "The system further includes a wideband analog-to-digital converter module that digitizes the in-phase and quadrature signals." (*Id.* 2:49-51.) These are the ADCs 218 and 228 in Fig. 2. The signal supplied to the ADCs is "one half of the RF signal bandwidth BW1 thanks to the complex down-mixer architecture" 211/221 (*Id.* 5:15-19, Fig. 2.) That is the reduction in bandwidth – achieved by mixers 211/221 – that allows the less expensive analog to digital converters to be used.

477. The output from the ADCs are "digital signals." (*Id.* 5:28-31.) These digital signals are supplied to a different "bank of N complex mixers 250," each of which "receives the digital signals… from ADCs 218 and 228 to extract a different one of the desired channels and frequency-shifts the extracted signals to the baseband frequency." (*Id.* 5:49-52.) Thus, the mixers 250 operate only on digital signals, and frequency shift *only the desired channels*. This digital downconversion is always disclosed as being done after the downconversion of the analog signal containing both the desired and undesired channels - it never replaces the analog downconversion.

478. All disclosed embodiments are similar in these regards. (See, e.g., Figs 2, 4 and 6).

479. As such, the specification does not describe or enable -- and in fact teaches away from -- a system which (i) does not downcovert the incoming analog signal before analog to digital (A-D) conversion; (ii) does not transform the analog signal into in-phase and quadrature components before A-D conversion; (iii) does not include a Radio Front End; (iv) digitizes the entire incoming RF signal as-is; (v) digitally downconverts both desired and undesired channels; or (vi) does not perform all of the claim steps in the order recited in the claim. Because, as

construed, the claim appears to cover all of these, the claim does not satisfy the written description or enablement requirements for each of these separate and independent reasons.

480. My opinion is confirmed by the testimony of inventors of the ’362 Patent. For example, Madhukar Reddy, the first named inventor on the face of the ’362 Patent, testified, during his deposition, that he did not see any disclosure of any embodiments in the specification where the entire RF signal spectrum is digitized. Reddy Rough Tr. at 41:22-43:3.

481. I have also reviewed the deposition testimony of another named inventor of the ’362 Patent, Timothy Gallagher. During his deposition, Mr. Gallagher confirmed that the architecture disclosed in the ’362 Patent was not meant to digitize the entire spectrum received at the RF input:

> Q Was it your understanding that this device was meant to digitize the entire spectrum being received at the RF input?
>
> A ***This looks like the architecture of the earlier product line where we were digitizing on the order of a hundred megahertz***. Although there's no reason you couldn't use the same sort of architecture to digitize the entire spectrum. In the end we didn't use this in our products for the so-called full spectrum products, did not use this architecture.

Gallagher Rough Tr. at 43:19-44:4. *See also id.* at 44:20-24 (“So this, what's called IQ sampling where you have two ADCs, that's the architecture we used for the so-called wide band products, the ones that preceded that came before the so-called full spectrum.”), *id.* at 45:4-7 (“Q The radio frond [sic] end was different than the full spectrum products than what's shown in this patent, right? A Yes. That's correct.”).

j. Objective Indicia of Non-Obviousness Regarding the ’ 362 Patent

482. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the ’362 Patent that I provided above. I understand that Charter has requested Entropic’s positions regarding secondary considerations and objective indicia of nonobviousness, to which Entropic did not provide a substantive, non-conclusory response. To the extent Entropic provides additional information regarding the claims of the ’362 Patent, I reserve the right to amend my opinions in response.

XIII. The ’682 PATENT

a. Background and Admitted Prior Art

483. U.S. Patent No. 10,135,682 (ENTROPIC_CHARTER_0000967 - 0000980) (the “’682 Patent”) relates to what the inventors describe as “service group management in a cable television network.” ’682 Patent, 1:50-52. According to the patent, “[c]onvention [sic] cable television networks can be inefficient and have insufficient capacity,” which, I understand, is a problem that this patent purports to overcome. *Id.*, 1:56-57.

b. Summary of the Alleged Invention of the 682 Patent

484. As a solution to the alleged problem of “inefficient” cable television networks, the ’682 Patent proposes a technique for a “cable modem termination system (CMTS)” to “determine, for a plurality of cable modems served by the CMTS, a corresponding plurality of SNR-related metrics.” *Id.*, Abstract. The CMTS then “[assigns] the modems among a plurality of service groups based on the SNR-related metrics.” *Id.* Once assigned to “service groups,” the CMTS may configure physical layer communication parameters to be used by any of the modems assigned to that service group based on an SNR-related metric of the service group to which the modem is assigned. *Id.*

c. Prosecution History of the ’682 Patent

485. The ’682 Patent was filed on January 9, 2018 as a continuation of U.S. Application No. 15/434,673 (the "’673 application," which is now U.S. Patent No. 9,866,438 (the "’438 Patent")), filed on February 16, 2017; which, itself, is a continuation of U.S. Application No. 15/228,703 (now U.S. Patent No. 9,577,886 (the "’886 Patent"), filed on August 4, 2016; which is a continuation of Application No. 13/948,444 (now U.S. Patent No. 9,419,858 (the "’858 Patent"), filed on July 23, 2013; which claims the benefit of U.S. Provisional Application No. 61/674,742 (the "’742 Provisional"), filed July 23, 2012. *See* ’682 Patent, Cover (63).

486. During prosecution of the ’682 Patent, the claims were rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-18 of the ’886 Patent, claims 1-18 of the ’858 Patent, and claims 1-18 of the ’438 Patent. *See* ENTROPIC_CHARTER_0005245 – 0005427 ("’682 Patent File History") at ENTROPIC_CHARTER_0005305 - 0005333. In response, the applicant submitted a terminal disclaimer over the ’858, ’886, and ’438 Patents. *Id.* at ENTROPIC_CHARTER_0005366 - 0005367. The application for the ’682 Patent was subsequently allowed. *Id.* at ENTROPIC_CHARTER_0005374 - 0005380.

d. Priority Date / Date of Conception

487. As the ’682 Patent claims priority to the applications for the ’438, ’886, and ’858 Patents, and to the ’742 Provisional, which was filed on July 23, 2012, I have applied the July 23, 2012 date in my analysis of the prior art.

e. Claim Construction

488. I understand that the Court has construed the disputed terms of the ’682 Patent as follows:

Term	Court's Construction
"a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics" (Claim 1)	Plain meaning.
"service group[s]" (Claim 1)	Plain meaning.
"[communicating with/corresponding to] said one of said plurality of service groups" (Claim 1)	Plain meaning.

CC Order at 63-64.

489. I have reviewed the Court's constructions and have analyzed the prior art under those constructions as discussed below. For all remaining terms, I have applied the plain and ordinary meaning of the terms as would have been understood by a POSITA as of the priority date of the '682 Patent.

f. Asserted Claims

490. I understand that Entropic accuses Charter of infringing claims 1-3 of the '682 Patent. I discuss below my opinions on the validity of these claims.

g. Invalidity of the '682 Patent Under 35 U.S.C. § § 102 And 103

491. In my opinion, Claims 1 and 2 of the '682 Patent are invalid as obvious in view of U.S. Patent Application Publication No. 2013/0041990 A1 (CHARTER_ENTROPIC00380698 – 00380707) ("Thibeault") in combination with U.S. Patent Application Publication No. 2012/0269242 A1 (CHARTER_ENTROPIC00036351 – 00036363) ("Prodan"). It is my opinion that claim 3 of the '682 Patent is invalid as obvious in view of Thibeault, in combination with Prodan and U.S. Patent Application Publication No. 2013/0107921 A1 (CHARTER_ENTROPIC00036397 – 00036411) ("Prodan '921").

492. Thibeault was filed on August 11, 2011 and was published on February 14, 2013. Prodan was filed on December 30, 2011 (claiming the benefit of priority to U.S. Provisional

Application 61/478,334, filed April 22, 2011), and was published on October 25, 2012. Prodan ’921 was filed April 23, 2012 (claiming the benefit of priority to U.S. Provisional Application 61/478,337, filed April 22, 2011), and was published on May 2, 2013.

i. Claims 1 and 2 Are Invalid In View of Thibeault In Combination With Prodan

493. In my opinion, as discussed in further detail below, Thibeault in combination with Prodan renders obvious claims 1 and 2 of the ’682 patent.

494. To the extent Thibeault does not disclose or render obvious the claims alone, in my opinion a POSITA would have been motivated to combine Thibeault with the teachings of Prodan with a reasonable expectation of success. For example, to the extent necessary, modifying Thibeault to include the grouping of cable modems based on “signal strength versus frequency profiles” (as disclosed in Prodan) would have entailed nothing more than combining known prior art techniques to improve similar devices in the same field, and applying a known technique to a known device ready for improvement to yield predictable results. As I explain below, Thibeault already discloses the generation of a composite SNR-related metric based, at least in part, on a worst-case SNR value measured on a logical channel over which cable modems communicate with a CMTS. It would have been obvious to a POSITA to modify (and improve) Thibeault by implementing Prodan’s known technique of measuring SNR across an entire range of frequencies (what the ’682 Patent refers to as an SNR profile) instead of on a single frequency and generating the composite SNR-related metric based in part on the worst SNR profile across a frequency range, rather than a worst SNR at a single frequency.

495. As I discuss below, a POSITA would have had a reasonable expectation of success implementing the teachings of Prodan to Thibeault, which would have been well within the capabilities of a POSITA and would have involved nothing more than the combination of prior art

elements according to known methods to yield predictable results. Both Thibeault and Prodan disclose techniques for assigning modulation profiles to cable modems by a CMTS based on measurements of SNR for the cable modems. Thus, implementing Prodan's grouping of cable modems according to an SNR profile alongside Thibeault's determination a composite SNR-related metric would have involved routine modifications to the software or firmware of Thibeault.

1. [1pre]: "A method comprising:"

496. I understand that this limitation is the preamble of claim 1. I have been asked to treat the preamble as a limitation. As such, in my opinion, Thibeault discloses it.

497. For example, Thibeault is entitled "METHOD AND APPARATUS FOR IMPROVING THROUGHPUT OF A MODEM." Thibeault, Cover Page (54). Thibeault discloses:

> ***a method for configuring logical channels in a network*** may comprise the steps of: determining network parameters associated with a network element based on network parameters received from the network element during a registration process in which the network element is registered on a first logical channel; analyzing the network parameters; and assigning network elements to a second logical channel based on the network parameters, and to instruct the network element to re-register with the network on the second logical channel different from the first logical channel.

Id., [¶ 0010].

498. Accordingly, in my opinion, this limitation is disclosed or suggested by Thibeault.

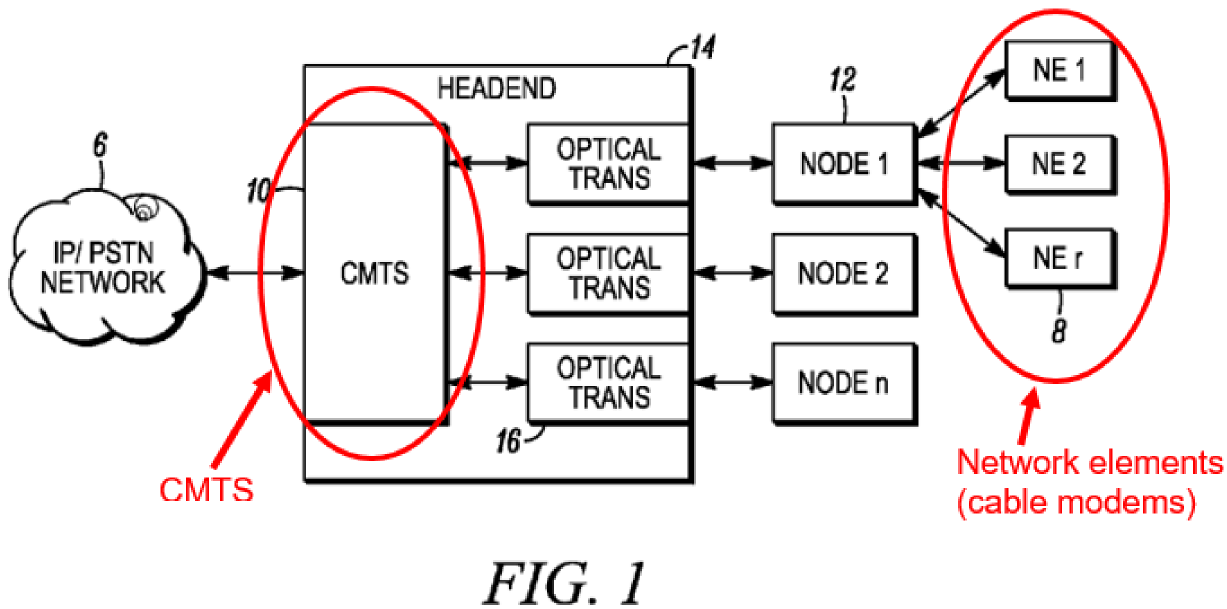
2. [1a]: "determining, by a cable modem termination system (CMTS), for each cable modem served by said CMTS, a corresponding signal-to-noise ratio (SNR) related metric;"

499. In my opinion, Thibeault discloses this feature.

500. Thibeault expressly discloses a cable modem termination system (CMTS) that serves a plurality of cable modems. For example, FIG. 1 of Thibeault (which I have reproduced below) depicts:

> an exemplary network in which a ***plurality of terminal network elements 8*** (e.g. ***cable modems***, set top boxes, televisions equipped with set top boxes, or any other element on a network such as a PON or a HFC network) are ***connected to a cable modem termination system (CMTS)*** 10 located in a headend 14 through nodes 12 and one or more taps (not shown).

Thibeault, [¶ 0025].



Id., FIG. 1 (annotated)

501. Thibeault discloses that its CMTS "determines" an "SNR-related metric" corresponding to each of the cable modems. For example, Thibeault discloses that a "network controller receives ranging messages from which ***network element parameters associated with the network element are determined***." *Id.*, Abstract. As I discussed above, "network elements" disclosed by Thibeault can include cable modems. "[N]etwork element parameters" disclosed in Thibeault "may include a modulation error ratio (MER) or ***a signal to noise ratio (SNR)***." *Id.*, [¶ 0009].

502. Although Thibeault does not define "network controller" in its specification, it would have been clear to a POSITA that this term refers to a CMTS. For example, Thibeault

discloses that "[t]he network element sends up a ranging request based on the information gathered from the UCD/MAPs. The ***CMTS*** will send the ranging response back to the network element." *Id.*, [¶ 0031]. Thus, this disclosure alone would have confirmed to a POSITA that the disclosed "network controller" (which determines network element parameters, including SNR) is a CMTS.

503. Thibeault clearly discloses that the CMTS is the device determines the SNR for the cable modems. For example, Thibeault discloses that "[t]he MER/***SNR for this invention is preferably measured by the CMTS*** using conventional measurement techniques, e.g. by the receiver, at the time of network element registration. The SNR will be available to be measured while the network element is ranging on the channel." *Id.*

504. A POSITA would have also understood that Thibeault's CMTS, which determines the SNR for a cable modem, does so for ***each*** cable modem that the CMTS serves. Thibeault describes that its

> invention provides an effective ability to ***maximize the data throughput of each network element subscriber (and the CMTS total throughput) at the time each network element registers with the CMTS***. The CMTS uses logical channels to help perform this task. Network elements are assigned (re-registered), using instructions from the CMTS, such as the upstream channel override protocol, to the logical channel that supports the modulation error ratio (MER) or signal to noise ratio (SNR) threshold that each network element meets or exceeds when it registers.

Id., [¶ 0023].

505. Accordingly, it is my opinion that Thibeault discloses or suggests this limitation.

3. [1b]: "assigning, by said CMTS, each cable modem among a plurality of service groups based on a respective corresponding SNR-related metric;"

506. In my opinion, Thibeault discloses this limitation.

507. I understand that the parties differed on the proper construction of the term "service group," CC Order at 55, and understand that the Court construed the term to have its "plain

meaning." *Id.* at 57. I understand that the Court, at the very least, requires a "service group" to, in some way, correspond to a "set of cable modems." *Id.* I also understand that Entropic apparently interprets the assignment of a cable modem to a "profile" or a "modulation profile" as an assignment to a service group. *See* Entropic's Second Suppl. Infringement Contentions, Ex. F, at 6, 13. I have also reviewed the intrinsic record of the '682 Patent and note that the specification or file history does not define the term "service group."

508. With this in mind, I conclude that Thibeault teaches that its CMTS assigns each of its cable modems "among a plurality of service groups." Thibeault discloses techniques for a "CMTS to best align network elements [e.g., cable modems, as I discussed above] with … available logical channels." Thibeault, [¶ 0016]. In the "Background of the Invention" of Thibeault, the reference describes that CMTS's before the time of Thibeault's invention "will be configured to be running multiple logical channels per physical upstream channel. ***Each logical channel will have a different modulation profile configured*** (but not limited to) such as quadrature phase shift keying (QPSK), 16QAM (quadrature amplitude modulation) and 32QAM." *Id.*, [¶ 0004]; *see also id.*, [¶ 0004] ("***Logical channel operation is a mechanism whereby multiple upstream channels may be configured with different operating parameters***, e.g. modulation modes, while all operating on the same physical channel", [¶ 0006] ("***When a cable operator configures the CMTS upstream ports with logical channels they will use a different modulation profile for each one***. An example would be to have logical channel 0 running QPSK, logical channel 1 running 16QAM, logical channel 2 running 32QAM and logical channel 3 running 64QAM.").

509. A POSITA would have understood Thibeault's logical channels as comprising multiple upstream channels on a common physical channel (i.e., from cable modems to the CMTS

that serve those cable modems), each of which is configured with different operating parameters, such as a modulation profile. Accordingly, and without necessarily agreeing with Entropic's view that a "profile" or "modulation profile" is a service group within the meaning of the '682 Patent, assuming that interpretation is correct, in my opinion, a POSITA would have understood that Thibeault's "logical channels," by dividing a physical communication path into multiple upstream channels having different modulation profiles, meets Entropic's definition of service groups.

510. Thibeault discloses that "[n]etwork elements are ***assigned*** (re-registered), u***sing instructions from the CMTS***, such as the upstream channel override protocol, t***o the logical channel that supports the modulation error ratio (MER) or signal to noise ratio (SNR) threshold that each network element meets or exceeds when it registers***." *Id.*, [¶ 0023]. Thus, in my view, Thibeault expressly "assigns" network elements (which, as I discussed in Section XIII.g.i.2, include cable modems) to logical channels (or "service groups").

511. In addition, as a POSITA would have understood from the above passage, the CMTS assigns each cable modem to a logical channel based on a respective SNR-related metric. Thibeault discloses a process performed by a CMTS "for automatically registering a network element [e.g., a cable modem] on a preferred logical channel." *Id.*, [¶ 0032]. I have reproduced FIG. 4 of Thibeault below:

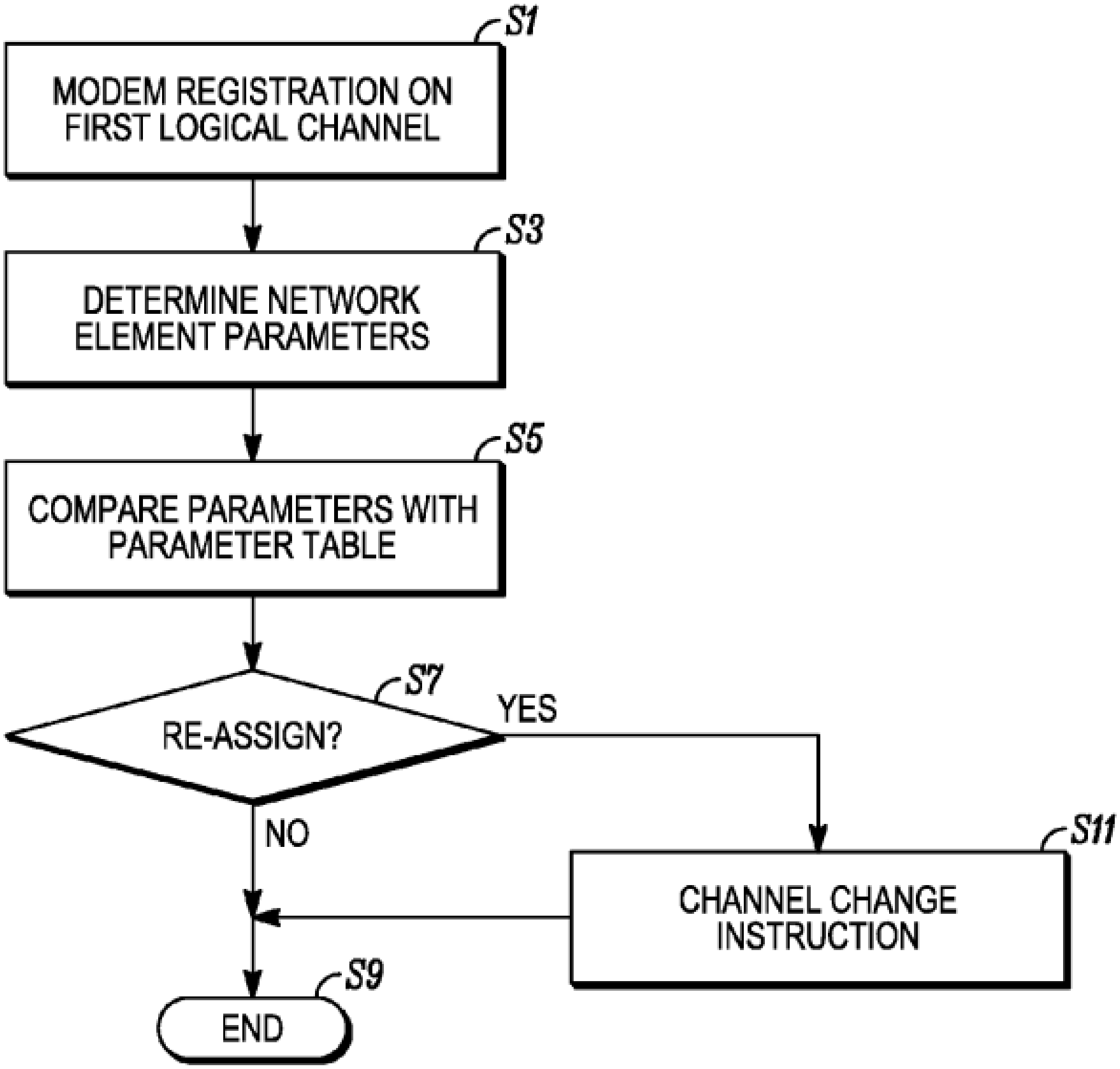


FIG. 4

512. As Thibeault discloses, "[n]etwork element parameters, e.g. ranging messages, which are indicative of the performance capabilities of the network element are read by the CMTS, as indicated in step S3. The ***network element parameters may indicate the network element's MER (SNR) value on the logical channel***, as well as other characteristics." *Id.*, [¶ 0032].

513. Further, in response to receiving the network element parameters (indicative of, among other things, the SNR of network element (i.e., cable modem) on a particular logical channel, and "[i]f the parameters indicate that the characteristics of the network element best align with another logical channel ***the network element is re-assigned [by the CMTS] to another logical channel***." *Id.*

514. Accordingly, in my opinion, Thibeault teaches or suggests this limitation.

4. [1c]: "generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups;"

515. In my opinion, Thibeault in combination with Prodan teaches of suggests this limitation.

516. I understand that the parties disagree on whether the term "composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics" is indefinite. I understand that the Court observed that "the claim [claim 1] merely recites a worse-case SNR profile that is based on the SNR-related metrics that correspond to each cable modem, and the composite SNR-related metric, in turn, is based on the worst-case SNR profile," and construed the term as having its "plain meaning." CC Order at 55. I also note that the term "composite SNR-related metric" is not found in the specification of the '682 Patent.

517. With this in mind, it is my opinion that this limitation would have been obvious to a POSITA in view of the combination of Thibeault and Prodan.

518. For example, with reference to the process depicted in FIG. 4, Thibeault discloses:

> Network element parameters, e.g. ranging messages, which are indicative of the performance capabilities of the network element are read by the CMTS, as indicated in step S3. The network element parameters may indicate the network element's MER (SNR) value on the logical channel, as well as other characteristics. ***As shown in step S5, the network element parameters are compared against a parameter***

> ***table containing a table of one or more parameter thresholds associated with a logical channel available on the network to determine if the CMTS needs to reassign that modem to a different logical channel on the currently used physical upstream port. The threshold values may be predetermined values or may be dynamically determined based on mathematical techniques such as a mean value of a measured network parameter, or a range of values set by an operator.***

Thibeault, [¶ 0032]. In my opinion, a POSITA would have understood that the parameter thresholds disclosed in Thibeault correspond to the '682 Patent's "composite SNR-related metrics."

519. Thibeault provides exemplary parameter threshold, and assignments of cable modems to different logical channels based on those thresholds:

> As an example parameter thresholds could be as follows: QPSK is set to an MER of 16; 16QAM is set to an MER of 22; 32QAM is set to an MER of 25; and 64QAM is set to an MER of 28. When a modem as the network element registers on logical channel 0 and its MER (SNR) value is 27 the CMTS card will issue an upstream channel override to that particular modem to re-register on logical channel 2 (32QAM) because its MER (SNR) says it can pass data cleanly at that modulation mode. The 32QAM mode will allow the modem the ability to generate better throughput because 32QAM has more bandwidth than the QPSK channel it would have stayed on when it registered the first time. The opposite can happen also if a modem registers on the 32QAM channel but its MER (SNR) value is 18, then it will be directed to override and re-register on lower modulation profile mode (lower bandwidth mode), e.g., logical channel 0 (QPSK). By doing this all the modems will be on the best modulation mode (best bandwidth) it can support and therefore increase throughput potential for all subscribers

Id., [¶ 0033].

520. My opinion is informed, for example, by the fact that Thibeault discloses that the thresholds can be "dynamically determined based on mathematical techniques such as a ***mean value of a measured network parameter***." *Id.*, [¶ 0032]. I understand that Entropic has maintained that a "*composite SNR-related metric* could include … the ***best-case*** SNR, an ***average*** SNR, or some other SNR-related metric entirely." Kramer Decl., ¶169. I also understand that Entropic takes the position that a composite SNR-related metric can be "a K-Means algorithm (or other statistical analysis)." Entropic's Second Suppl. Infringement Contentions, Ex. F, at 8. Thus,

assuming that Dr. Kramer's and Entropic's interpretation of what a "composite SNR-related metric" means, a POSITA would have understood that Thibeault discloses it.

521. A POSITA would also have understood, or at least found it obvious, that Thibeault's mean threshold value would be "based at least in part" on a worst-case value of the measured network parameter, such as an SNR. For example, to compute an average (or mean) SNR value, a POSITA would have understood that, out of the SNR values measured, one value would be the lowest SNR, or, in the language of the claim, the "worst case." Indeed, this appears to be consistent with how Entropic understands what the limitation "based at least in part on a worst-case SNR profile" means, since, as I discussed above, Entropic relies on Charter's alleged usage of a "K-Means algorithm (or other statistical analysis)." *Id.*

522. In my opinion, a POSITA would have understood that Thibeault's threshold values (composite SNR-related metrics) are generated for each logical channel (i.e., service group). For example, Thibeault discloses:

> The network element parameters may indicate the network element's MER (SNR) value on the logical channel, as well as other characteristics. As shown in step S5, the network element parameters are compared against a parameter table ***containing a table of one or more parameter thresholds associated with a logical channel*** available on the network to determine if the CMTS needs to reassign that modem to a different logical channel on the currently used physical upstream port.

Thibeault, [¶ 0032].

523. In my view, a POSITA would have understood that the CMTS is the element disclosed by Thibeault that generates the threshold values by "dynamically determine[ing the threshold values] based on mathematical techniques such as a mean value of a measured network parameter." *Id.* For example, Thibeault discloses that "[a] processing unit for a software or firmware implementation is preferably contained in the ***CMTS*** i***n the case of the process in FIG. 4.***" *Id.*, [¶ 0039]. In my opinion, this would either strongly suggest or, at the very least, render

obvious, configuring the CMTS (which already receives the network element parameters on which the mean value is based) to dynamically determine that mean value.

524. I note that claim 1 requires that the composite SNR-related metric is based at least in part on a worst-case SNR ***profile***. I understand that the '682 Patent refers to an SNR profile as "SNR over a range of frequencies." *See, e.g.*, '682 Patent, 3:57-58. As I discussed above, Thibeault discloses that "[n]etwork element parameters, e.g. ranging messages, which are indicative of the performance capabilities of the network element are read by the CMTS … The network element parameters may indicate the network element's MER (SNR) value on the logical channel." *Id.*, [¶ 0032].

525. To the extent that Thibeault does not disclose an "SNR profile," this feature is disclosed by Prodan. Prodan, entitled "Frequency Spectrum and Modulation Scheme Allocation for High Speed Data Networks," attempts to solve the need "for frequency spectrum and modulation scheme allocation techniques that optimize power utilization and enable similar upstream transmission power by cable modems and signal-to-noise (SNR) ratio at the headend." Prodan, [¶ 0007].

526. In my view, a POSITA would have recognized that both Thibeault and Prodan aim to improve and optimize performance and throughput. This is demonstrated by a comparison of Thibeault, [¶ 0001] ("This disclosure is directed toward improving throughput for a network element in a network.") with Prodan, [¶ 0047] ("a person of skill in the art would appreciate that a variety of algorithms may be used to enable frequency spectrum allocation and/or modulation scheme assignment … to optimize one or more performance parameters (e.g., power utilization, SNR levels, transmit powers, throughput, network load, etc.").

527. Prodan also expressly recognized that "cable modems will have different signal strength versus frequency profiles measured at the headend." *Id.*, [¶ 0047]. Prodan depicts exemplary profiles in FIG 2, with I have reproduced below:

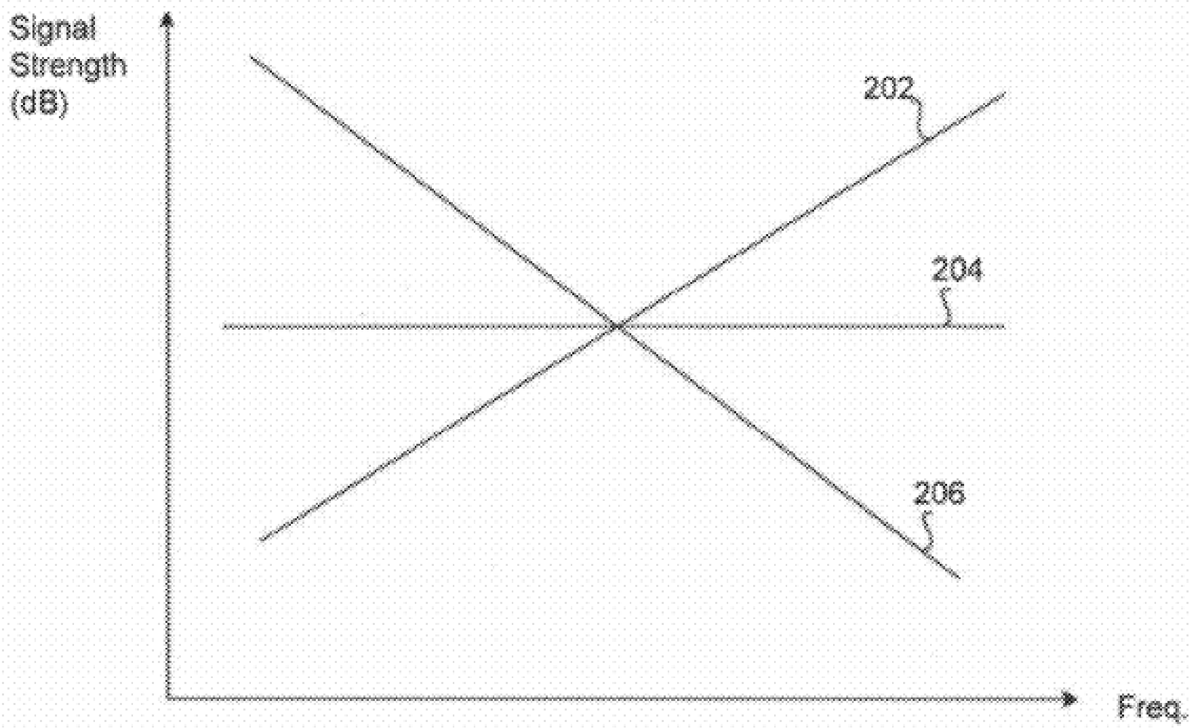


FIG. 2

Id., FIG. 2. According to Prodan, FIG. 2 depicts "example signal-to-noise ratio (SNR) versus frequency profiles of different CMs in a cable network." *Id.*, [¶ 0025]. In my opinion, Prodan's frequency profiles are akin to the SNR profiles of the '682 Patent.

528. As Prodan discloses, the frequency profiles are used "to reduce and/or optimize power utilization in a cable network." *Id.*, [¶ 0028]. Prodan achieves this goal, for example, by

grouping cable modems "based on their signal strength versus frequency profiles." *Id.*, [¶ 0034]. Prodan uses "the tilt (or slope) of [a cable modem's] signal strength versus frequency profile curve" to, similar to Thibeault, assign the cable modem to a modulation scheme. *Id.*

529. Therefore, in my opinion, a POSITA would have been motivated to apply the teachings of Prodan (which measures SNR profiles of cable modems) to Thibeault (which discloses the measurement of an SNR value for its cable modems) in order to further improve power utilization in a cable network that already implements Thibeault's logical channel assignment techniques. In my view, a POSITA would have had a reasonable expectation of success in achieving this result.

530. In my opinion, it would also have been well within the abilities of a POSITA to configure Thibeault's CMTS to generate a composite SNR-related metric (e.g., an average or mean value) based at least on a worst-case SNR ***profile***, in addition to a worst-case SNR value, as Thibeault already teaches. Specifically, a POSITA would have been able to generate, for example, a mean value of Prodan's SNR profiles just as easily as they could generate a mean value for a single SNR value.

531. In my view, combining the teachings of Prodan with Thibeault would have involved nothing more than applying a known technique (i.e., Prodan's measurement of SNR versus frequency profiles) to a known device ready for improvement (i.e., Thibeault's system, which measures SNR values and computes a composite SNR-related metric based on a worst case SNR value) to yield a predicable result (i.e., the Thibeault-Prodan system which generates a composite SNR-related metric based on a worst case SNR profile).

532. Accordingly, it is my opinion that Thibeault combined with Prodan discloses or suggests this limitation, or at the very least renders it obvious.

5. [1d]: "selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric; and"

533. In my opinion, Thibeault in combination with Prodan discloses or suggests this limitation, or at least renders it obvious.

534. I understand that the parties disagree as to whether the term "communicating with said one of said plurality of service groups" embedded within this limitation is indefinite due to a lack of antecedent basis. *See* CC Order at 58. I also understand that the Court, in construing this term and limitation as not indefinite, held that the term "said one of said plurality of service groups" "refers back to '*each* one of said plurality of service groups.'" *Id.* at 60 (emphasis in original). Although I do not believe that there is a clear antecedent basis for "said one of said plurality of service groups," I have, for the purposes of my analysis of the prior art, adopted the Court's interpretation.

535. I also understand that Entropic appears to interpret this claim requirement as being met by a CMTS (or other system) "select[ing] at least one [modulation] profile for each service group." Entropic's Second Suppl. Infringement Contentions, Ex. F, at 9-10.

536. With these observations, it is my opinion that Thibeault discloses this limitation. For example, Thibeault as background to the invention:

> The CMTS (Cable Modem Termination System) will be configured to be running multiple logical channels per physical upstream channel. ***Each logical channel will have a different modulation profile configured (but not limited to) such as quadrature phase shift keying (QPSK), 16QAM (quadrature amplitude modulation) and 32QAM. Logical channel operation is a mechanism whereby multiple upstream channels may be configured with different operating parameters, e.g. modulation modes, while all operating on the same physical channel.*** DOCSIS 2.0 introduced this concept to support simultaneous operation and therefore backwards compatibility of TDMA, ATDMA, and SCDMA cable modems

Thibeault, [¶ 0004].

537. Thus, as disclosed by Thibeault, the CMTS configures a physical layer communication parameter (e.g., 32 QAM, which is a type of modulation) to be used for communicating with modems in a service group (i.e., a logical channel).

538. I note that the selection (or configuration) of the physical layer communication parameter is required to be based on the "composite SNR-related metric." To the extent that Thibeault does not expressly disclose that the modulation profiles that its logical channels are configured to transmit on are based on a composite SNR metric, then, in my opinion, a POSITA would have found it obvious to do so.

539. As I discussed in Section XIII.g.i.4, Thibeault discloses parameter thresholds can be "dynamically determined based on mathematical techniques such as a mean value of a measured network parameter." *Id.*, [¶ 0032]. These dynamically determined thresholds, as I explained above, are "composite SNR-related metrics." In my opinion, it would have been obvious to a POSITA to configure a CMTS to, itself, configure modulation parameters for each logical channel taking into account SNR thresholds. As Thibeault discloses, instructing a modem to change from transmitting on one logical channel to another logical channel is not always reliable. Indeed, as Thibeault observes, "[w]hile the approach may work well under ideal conditions, many modems do not handle those [channel change]protocols properly. If the modems fail to move with those protocols then they may possibly deregister causing loss of service for subscribers." *Id.*, [¶ 0007]. Thus, a POSITA would have been motivated to configure each logical channel appropriately so as to minimize the number of times that a modem needs to change channels. In my opinion, using average SNR values (or average SNR profiles) is a reasonable approach to configuring appropriate modulation profiles for each logical channel to minimize the need for modems to change channels.

540. Therefore, in my opinion, Thibeault in combination with Prodan teaches or suggests this limitation, or at least renders it obvious.

6. [1e]: "communicating, by said CMTS, with one or more cable modems corresponding to said one of said plurality of service groups using said selected one or more physical layer communication parameter."

541. In my opinion, Thibeault in combination with Prodan discloses or suggests this limitation.

542. I understand that the parties disagree on whether the term "corresponding to said one of said plurality of service groups" embedded within this limitation lacks antecedent basis. CC Order at 58. As I discussed above in Section XIII.g.i.5, I understand the Court construed this term and limitation as not indefinite, and held that the term "said one of said plurality of service groups" "refers back to '*each* one of said plurality of service groups.'" *Id.* at 60 (emphasis in original). I reiterate that, in my opinion, this limitation lacks antecedent basis, but have, for the purposes of my analysis of the prior art, adopted the Court's interpretation.

543. I understand that Entropic's interprets this limitation as being met by the "CMTS communicat[ing] with the CMs using … updated IUC/modulation profiles."

544. With this in mind, Thibeault discloses an example of how its invention works:

> As an example parameter thresholds could be as follows: QPSK is set to an MER of 16; 16QAM is set to an MER of 22; 32QAM is set to an MER of 25; and 64QAM is set to an MER of 28. When a modem as the network element registers on logical channel 0 and its MER (SNR) value is 27 ***the CMTS card will issue an upstream channel override to that particular modem to re-register on logical channel 2 (32QAM)*** because its MER (SNR) says it can pass data cleanly at that modulation mode. ***The 32QAM mode will allow the modem the ability to generate better throughput because 32QAM has more bandwidth than the QPSK channel it would have stayed on when it registered the first time.***

Id., [¶ 0033].

545. As shown in this example, after assigning a particular cable modem from one logical channel (channel 0) to another logical channel (channel 2), the CMTS proceeds to communicate with that cable modem using the physical layer parameter (in this case, 32QAM) that corresponds to the new logical channel (channel 2).

546. Accordingly in my opinion, Thibeault in view of Prodan discloses or suggests this limitation.

7. [2]: "The method of claim 1, wherein said one or more physical layer communication parameter includes one or more of: transmit power, receive sensitivity, timeslot duration, modulation type, modulation order, forward error correction (FEC) type, and FEC code rate."

547. In my opinion, Thibeault in combination with Prodan discloses or suggests this claim.

548. I understand that Entropic, in its infringement contentions, states that "[a] modulation profile constitutes at least a modulation type and/or a modulation order." Entropic's Second Suppl. Infringement Contentions, Ex. F, at 14.

549. As such, under this interpretation, Thibeault specifically discloses, as background of the invention, "Each logical channel will have a different ***modulation profile*** configured (but not limited to) such as quadrature phase shift keying (QPSK), 16QAM (quadrature amplitude modulation) and 32QAM." *Id.*, [¶ 0004].

550. Accordingly, in my opinion, Thibeault in combination with Prodan discloses or suggests this claim.

ii. Claim 3 Is Invalid In View of Thibeault In Combination With Prodan and Prodan ' 921

551. In my opinion, as I discuss in further detail below, Thibeault in combination with Prodan and Prodan '921 would have rendered claim 3 obvious.

1. [3]: "The method of claim 1, wherein said CMTS uses orthogonal frequency division multiplexing (OFDM) over a plurality of subcarriers for said communicating."

552. As I discussed above, Thibeault in combination with Prodan would have rendered claim 1 obvious. *See supra* at Section XIII.g.i.

553. I note that neither Thibeault nor Prodan disclose the additional limitations of claim 3. However, Prodan '921 discloses these features.

554. Similar to Prodan, Prodan '921 observes that different cable modems may have SNR versus frequency profiles that "exhibit different tilts (slopes) as a function of frequency." Prodan '921, [¶ 0025]. Prodan '921 discloses:

> Embodiments of the present disclosure exploit … anticipated tilts of signal strength (e.g., measured in terms of SNR) versus frequency profiles of CMs to reduce and/or optimize power utilization in a cable network. In particular, embodiments recognize that by pre-compensating the tilt of the upstream channel at the cable modem, higher power utilization efficiency can be achieved.

Id., [¶ 0028]. To achieve its goal of pre-compensating for the tilt of the cable modems' SNR versus frequency profile, Prodan '921 discloses:

> CMs are grouped based on their SNR versus frequency profiles into multiple categories. The category that a CM belongs to governs pre-compensation at the CM. For example, as shown in the example of FIG. 8, the SNR versus frequency space may be partitioned into three categories I, II, and III. Each CM is associated with one of the categories based on the tilt (or slope) of its SNR versus frequency profile curve.

Id., [¶ 0032].

555. Thus, in my view, like Thibeault and Prodan, Prodan '921 is directed to optimizing performance and power utilization in a cable network. Hence, a POSITA would have been motivated to look to the teachings of Prodan '921 in order to further improve the cable network disclosed in Thibeault.

556. Prodan '921 also discloses an embodiment in which pre-compensation for the tilt in the SNR versus frequency profile can be done using "bit loading techniques." *Id.*, [¶ 0039]. Specifically, Prodan '921 discloses:

> According to example implementation 600, a CM (e.g., CM 110 e) includes a transmitter 602 with dynamic bit loading features. Bit loading is a technique that allocates bits to be ***transmitted according to the quality of sub-channels (e.g., OFDM sub-channels or a single carrier within a channel bonded carrier group)***. In other words, more bits are transmitted over higher quality sub-channels, and less bits are transmitted over lower quality sub-channels. The overall effect of bit loading is that the SNR levels (at the headend) over higher and lower quality sub-channels are brought closer to each other, i.e., that the SNR versus frequency profile of the CM is tilt and modulation order (bit loading) compensated.

Id., [¶ 0040].

557. In my opinion, a POSITA would have recognized that OFDM communication over a plurality of subcarriers (or "sub-channels," in the words of Prodan '921) would have been feasible (and compatible) with the cable networks disclosed in Thibeault and in Prodan. Indeed, it is my view that implementing the Thibeault-Prodan cable network using OFDM communication, as disclosed in Prodan '921, would have involved nothing more than the simple combination of known prior art elements: (1) cable networks that group cable modems into logical channels; (2) in accordance with composite SNR-related metrics (Thibeault); (3) based on worst case SNR profiles (Thibeault and Prodan); and which support OFDM communication between the CMTS and cable modems (Prodan '921).

558. In my opinion, Thibeault in combination with Prodan and Prodan '921 disclose this claim or, at the very least, render it obvious.

h. Subject Matter Eligibility

559. I have been asked to provide my opinions on the subject matter eligibility of the asserted claims of the '682 Patent. In my opinion, claim 1 of the '682 Patent is invalid because it is directed to an abstract idea and fails to recite an inventive concept. For the purposes of my

analysis, I consider claim 1 to be representative of the asserted claims because claims 2 and 3 also fail to remedy the deficiencies of claim 1 and are, as a result, abstract for the same reasons.

560. Claim 1 recites generic steps that involve nothing more than the abstract idea of grouping cable modems based on a common characteristic and then communicating with all cable modems in the same group in the same way. The fact that the common characteristic must be related to SNR, or that the way to communicate with each group is determined based on "a composite SNR-related metric" does not change that fact.

561. SNR is a conventional, long well-known measured characteristic of communications systems which include cable modem communications. *See, e.g.*, Thibeault, [¶¶ 0031-33]. Similarly, "spoken language" is a long well-known characteristic of people. Grouping cable modems by SNR is the same abstract concept as grouping newly-arrived foreign-language speakers at a school into rooms by the language they speak.

562. Once the cable modems are grouped by SNR, a "composite SNR-related metric" is used to determine how to communicate with all of the cable modems in that group. All communications must accommodate the cable modem having the worst SNR in the group -- the cable modem that will be least able to understand the communication. This is because, if one chooses how to communicate with the group by accommodating the cable modem that is least able to communicate, those parameters can be used to communicate with all of the cable modems in the service group. The "composite SNR-related metric," in effect, represents the cable modem in that group that is least able to communicate.

563. Similarly, once newly-arrived foreign-language speakers arrive at the school, they may be assigned to rooms based on the language they speak. The administration may then determine, for each room, the grade levels at which those in the room can speak in their respective

languages (such as beginner's Spanish, Level 2 Spanish, etc.). The more education someone has, the more sophisticated the words and phrases that can be used in communicating with the people in the room. This would be a "composite language-related metric," analogous to the "composite SNR-related metric." Because you are going to communicate with everyone in the classroom the same way, you must select vocabulary to accommodate the least educated person in the room.

564. This is the abstract idea to which the '682 Patent is directed. Without detail as to how the composite SNR-related metric is determined and applied to the cable modems the asserted invention is basically the abstract idea of grouping the cable modems based on ***some*** characteristic.

565. Importantly, the claim, does not, with any specificity, describe ***how*** any of the claimed steps are performed. The steps are all recited at a high level of generality and fail to give any indication of how the method improves the functionality of a computer or system of computers. Similarly, the specification fails to set forth any improvement to the technology of a CMTS, a cable modem, or a cable network, other than a conclusory statement that "advantages, aspects and novel features of the present invention, as well as details of an illustrated embodiment thereof, will be more fully understood from the following description and drawings." '682 Patent, 2:3-6.

566. In summary, it is my opinion that claim 1 recites an abstract idea at a high-level of functionality that does not recite a specific improvement to known cable networking components. The claims are written in functional results-based language, without sufficient detail as to how the results are achieved. For these reasons, claim 1 is directed to the abstract idea identified above.

567. In addition to being directed to an abstract idea, claim 1 merely recites generic, conventional functions that do not add significantly more to the abstract idea itself. Claim 1 is a method that is performed, at every step, by a CMTS. As evidenced by the prior art, CMTS' and cable modems were well known, routine, and conventional components of cable networks well

before the alleged priority date of the ’682 Patent. Indeed, the ’682 Patent itself discloses that the invention can be carried out, typically, by general-purpose computers:

> the present invention may be realized in hardware, software, or a combination of hardware and software. The present invention may be realized in a centralized fashion in at least one computing system, or in a distributed fashion where different elements are spread across several interconnected computing systems. Any kind of computing system or other apparatus adapted for carrying out the methods described herein is suited. ***A typical combination of hardware and software may be a general-purpose computing system with a program or other code that, when being loaded and executed, controls the computing system such that it carries out the methods described herein.*** Another typical implementation may comprise an application specific integrated circuit or chip.

’682 Patent, 7:31-44.

568. Neither claims 2 nor claim 3 amount to significantly more than the abstract idea recited by claim 1. For example, as claim 2 recites, communication parameters such as “transmit power,” “receive sensitivity,” “timeslot duration,” “modulation type,” modulation order,” forward error correction (FEC) type,” and “FEC code rate” are all well known, routine, and conventional in the field of data communications. With respect to claim 3, “orthogonal frequency division multiplexing (OFDM)” was a routine and conventional communication technique well before the alleged priority date of the ’682 Patent, and which I discussed with respect to the ’690 Patent.

569. As a result, in my opinion, claims 1-3 of the ’682 Patent does not recite anything more than an abstract idea implemented by conventional components and functions. To the extent Entropic provides additional information regarding the claims of the ’682 Patent at a later date, I reserve the right to amend my opinions in response.

i. Invalidity Under 35 U.S.C. § 112

i. “generating, by said CMTS . . .a composite SNR-related metric based at least in part on a worst-case SNR profile” (Claim 1)

570. As described above, the ’682 Patent relates to assigning cable modems to service groups. According to the specification, once these assignments are made, the CMTS

communicates with all cable modems in the same service group using the same communications parameters. ’682 Patent, 5:40-46.

571. The CMTS determines how to communicate with the cable modems in each service group by using a “composite worst-case SNR profile” for that service group. ’682 Patent, 4:9-20. This means that for every subcarrier, the composite worst-case SNR profile reflects the worst-case SNR for that subcarrier among the CMs in that particular service group. ’682 Patent, 5:40-46. By accommodating the “worst case” CM at every subcarrier, the CMTS can assure that all of the CMs in a service group can receive communications at all of the subcarriers. ’682 Patent, 5:46-6:2. Dr. Almeroth provides further details of the specification’s disclosure. Almeroth ¶¶ 85-92.

572. Claim 1 of the ’682 Patent does not call for use of a “composite worst-case SNR profile” in order to determine how to communicate with the CMs in a service group. Instead, it requires the CMTS to generate a so-called “composite SNR-related metric” for each service group “based at least in part on a worst-case SNR profile” of a service group. There is nothing about this limitation that finds any support in the specification. The specification does not disclose a “composite SNR-related metric,” it does not disclose a “worst-case SNR profile” that is not a “composite” profile, and it does not disclose basing the former on the latter. The claim therefore lacks written description and enablement.

573. I understand that further that Entropic argued during claim construction that “composite SNR-related metric” and “worst-case SNR profile” did not both refer to the disclosed “composite SNR-related metric” in part because the “composite SNR-related metric” could “include the ***best-case*** SNR, an ***average*** SNR, or some other SNR-related metric entirely.” Kramer Decl., ¶169 (emphasis in original). Entropic ultimately “won” this argument. For this additional reason, the full scope of the claim is not described or enabled, as “best-case SNR” and “average

SNR" appear nowhere in the specification. There is no description of how to enable the invention with the use of such "metrics."

574. I also understand that one of the named inventors of the '682 Patent, Mr. Sridhar Ramesh, testified during his deposition that the specification of the patent contains no description of a composite SNR-related metric that can be based upon a ***best*** case SNR:

> Q. And your patent doesn't specifically describe as an example using the best case SNR scenario in considering how to group the devices and service groups; is that fair?
> …
> A. None that I see in here.

Ramesh Rough Tr. at 32:11-18.

575. I have also reviewed the deposition testimony of Mr. Timothy Gallagher, who is also a co-inventor of the '008, '826, and '362 Patents. Mr. Gallagher similarly confirmed that a best-case SNR is not the basis for selecting communication parameters because, as Mr. Gallagher confirmed, there would be no assurance that the modems in a group that have worse SNR profiles than would be able to communicate using such parameters. *See* Gallagher Rough Tr. at 49:11-18. As discussed above, the whole abstract idea only works because one is accommodating the ***worst communicator.*** Accommodating only the best communicator would mean no other cable modem is in the group—or foreigner in the room—would be able to communicate.

576. Finally, there is no written description or enablement of the CMTS "generating" the disclosed "composite worst-case SNR profile," much less the undisclosed "composite SNR-related metric based at least in part on a worst-case SNR profile . . . ."

577. Therefore, it is my opinion that the term "generating, by said CMTS . . . a composite SNR-related metric based at least in part on a worst-case SNR profile" is unsupported by the

written description of the '682 Patent and fails to enable a POSITA to practice the full scope of the claim.

j. Objective Indicia of Non-Obviousness Regarding the '682 Patent

578. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the '682 Patent that I provided above. I understand that Charter has requested Entropic's positions regarding secondary considerations and objective indicia, to which Entropic did not provide a substantive, non-conclusory response. To the extent Entropic provides additional information regarding the claims of the '682 Patent, I reserve the right to amend my opinions in response.

XIV. CONCLUSION

579. For the reasons stated herein, it is my opinion that each and every patent asserted against Charter in this litigation is invalid. I reserve the right to respond to any evidence (including expert opinions) that Entropic may offer in response to my opinions.

Steven H. Goldberg, Ph.D. (E.E.)